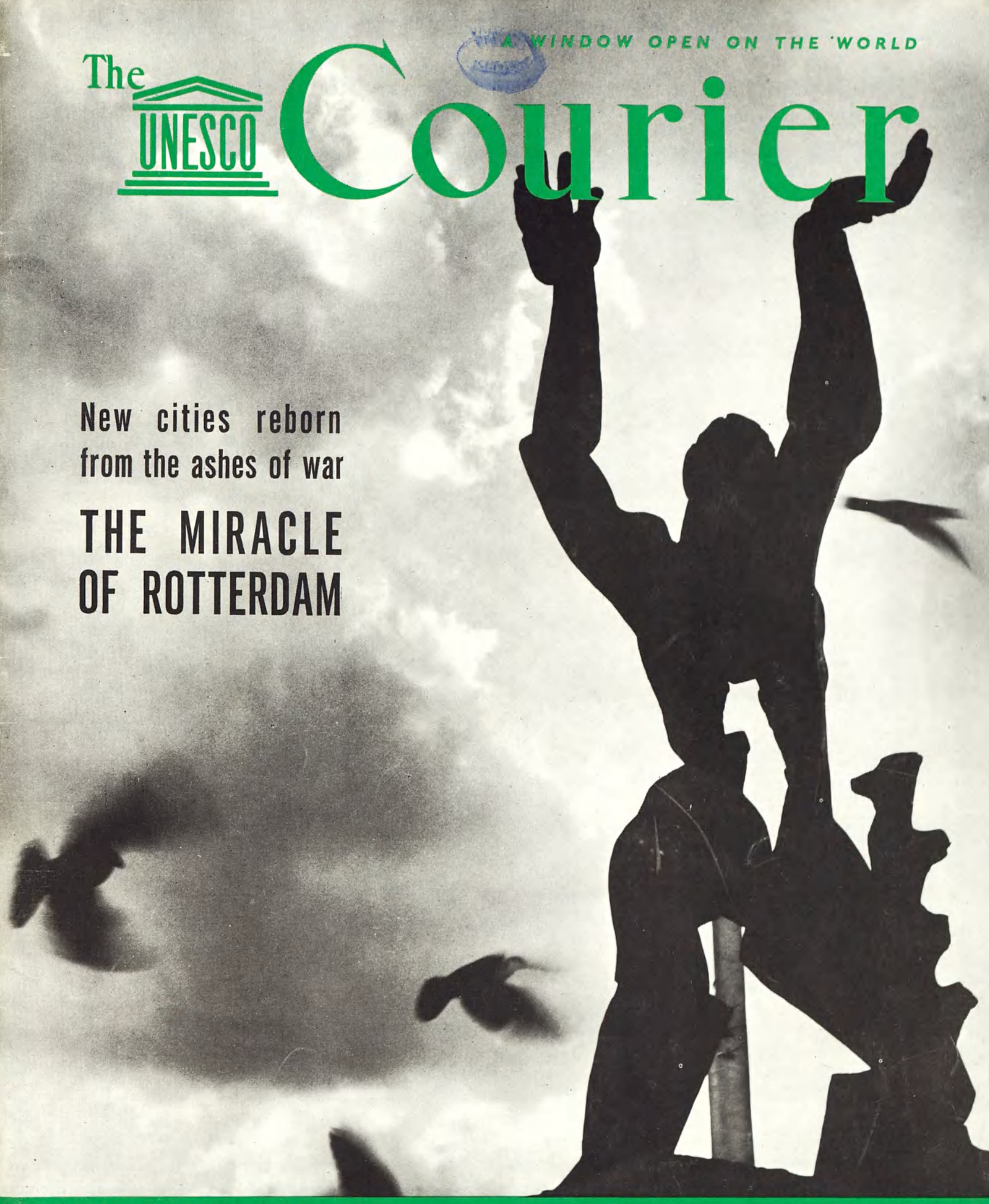
A WINDOW OPEN ON THE WORLD

The UNESCO Courier



New cities reborn from the ashes of war

THE MIRACLE OF ROTTERDAM

JULY-AUGUST
1959
(12th year)

IS THE OCEAN IN DANGER?

(See page 28)

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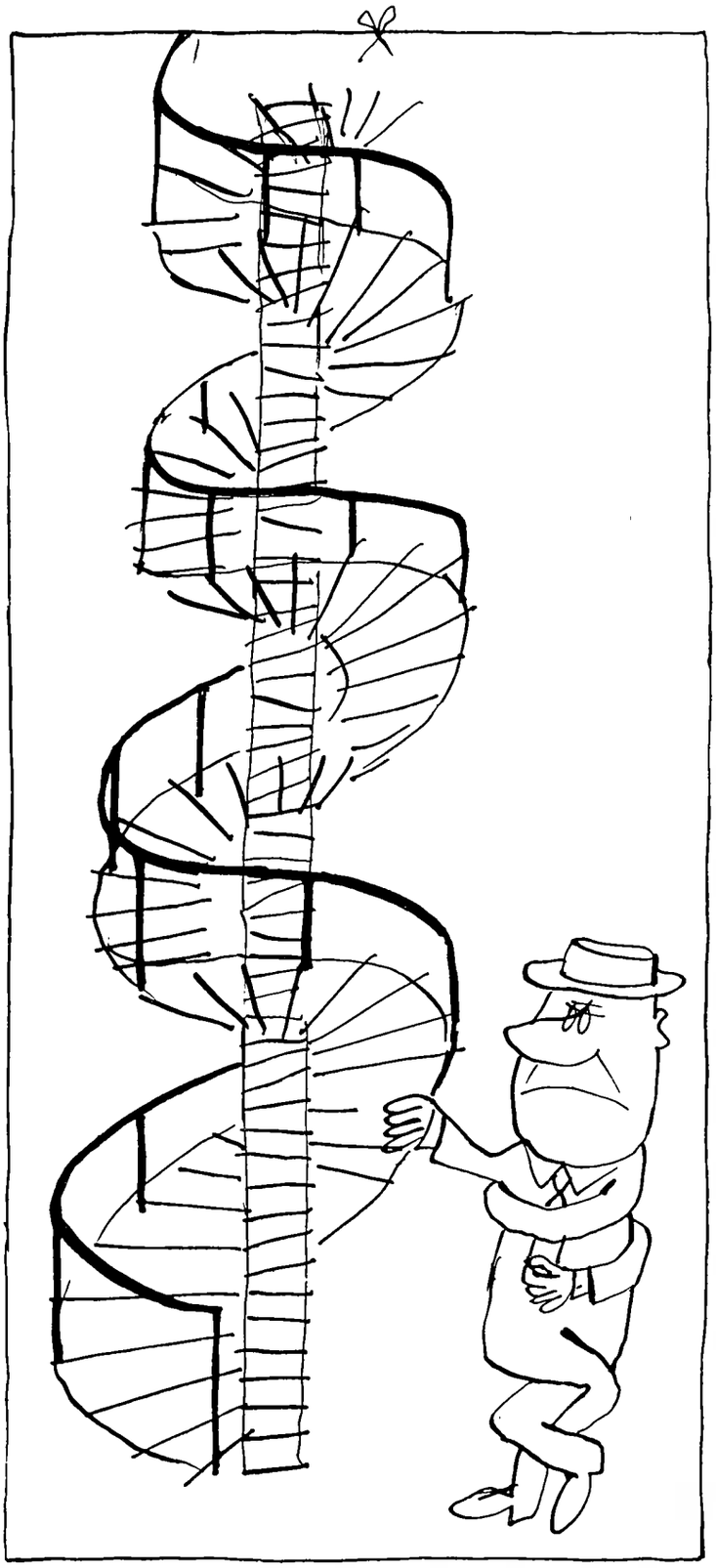

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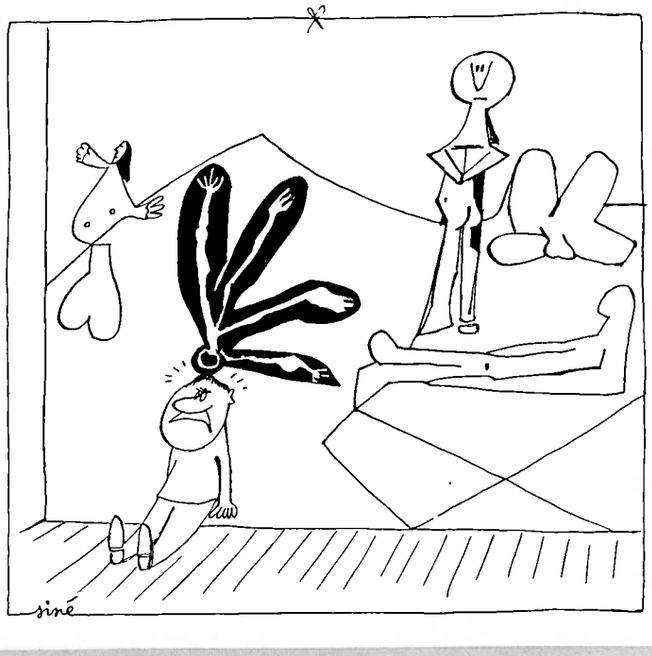

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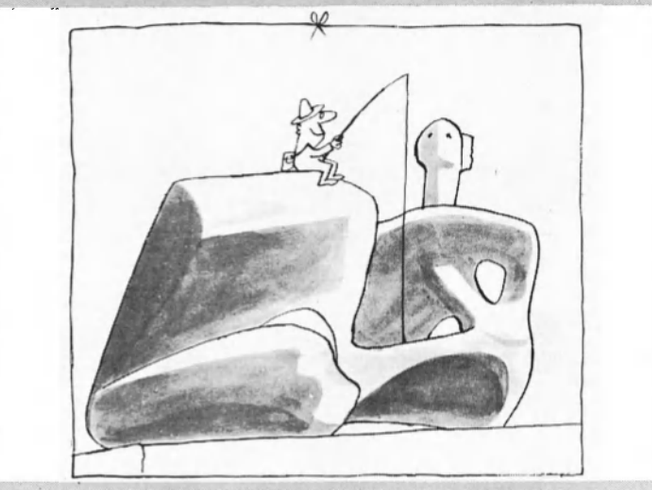

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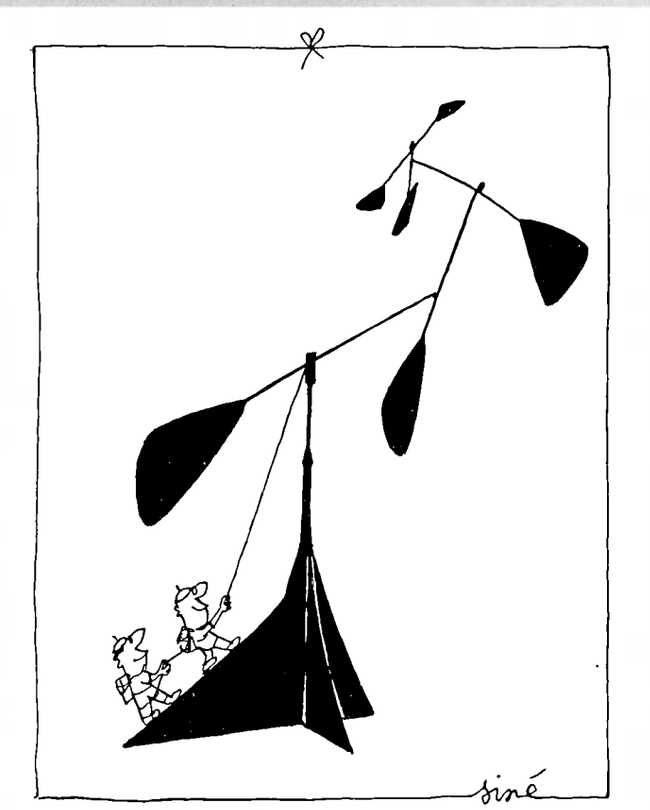

CALDER'S MOBILE

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The UNESCO Courier
A WINDOW OPEN ON THE WORLD

JULY-AUGUST 1959
12TH YEAR

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COVER PHOTO

In May 1940, a devastating bombardment transformed Rotterdam into a sea of flames which burned for 40 days and 40 nights and left 6,000 million cubic feet of rubble to be cleared away. Today Rotterdam is one of the world's most imposing cities. This is the "miracle" of Rotterdam. Striking works of art in the streets and squares, like Zadkine's monument (above) erected to commemorate Rotterdam's ordeal, also serve as symbols of its resurrection.

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Published monthly by
The United Nations Educational, Scientific and Cultural Organization

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THE UNESCO COURIER is published monthly (12 issues a year) in English, French, Spanish and Russian. The United States of America edition is distributed by the UNESCO Publications Center, U.S.A. 801 Third Avenue, New York 22, N.Y., Plaza 1-3860. Second-class mail privileges authorized at New York, N.Y. (M.C. 59.1.138 A)

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PEERING INTO THE MIND OF A CHILD

WHEN does a child start to "think"? At what age can he understand such ideas as length and number? When is he capable of what is called "scientific thought"?

Educators and parents the world over would be extremely interested in knowing the answers to such questions. Today, they are being sought in Switzerland at the Institute for the Sciences of Education in Geneva. The Institute was founded in 1912 and attached to the University of Geneva in 1929, but its origins go even further back. In 1901, at the dawn of the new century, the Medical Society of Geneva heard a daring proposal by Edouard Claparède, the future co-founder of the Institute along with Pierre Bovet. Claparède called for nothing less than a school "made to measure" for children. Into his startled audience, he dropped this bombshell: "We now pay more attention to children's feet than we do to their minds."

Five years later, Claparède was to state: "It is just as important for the educator to know the laws of the mind and its growth as it is for the horticulturist to know the biology of plants or the doctor to know the physiology of organs." It was on this principle that the Institute started a laboratory in which experimental psychology is applied to education. For the past thirty years, both at Geneva and at Neuchatel, this work has been carried on by Prof. Jean Piaget, a leading figure in psychological research which has a bearing on education.

Prof. Piaget's studies had previously shown that the development of a child's thought processes can be compared to a ladder. The child goes from one step or level to another. At each level, corresponding to a certain age, there is an equilibrium in his thinking.

Then, two years ago, a special section of the Institute was created to study how the child passes from one stage to another. This study, directed by Dr. Bärbel Inhelder, professor at the Institute of Child Psychology, and Dr. Gerald Noelting, is based upon a long-term experiment. Twenty children, divided into four age groups, have been selected from Geneva schools for study. They come from all social classes, have average intelligence test ratings and have experienced no special difficulties in school.

They have it all taped

SOME fifty tests based on special observation techniques developed by Prof. Piaget over the years are used with these children. In addition, the research workers have at their disposal an experimental psychology laboratory set up by the state of Geneva and provided with ultra-modern equipment through a grant from an American foundation.

In this laboratory, each conversation between the scientist and a child is recorded on tape. At key points in the interview, a motion picture camera comes into play. The result is that the Institute has been able to "produce" records and a film on each child, showing the changes in his social behaviour and the way his mind works at various

WHO photos by Eric Schwab

HOW DO YOU THINK I SEE THIS LANDSCAPE? An educational researcher puts the above question to a child who must select the drawing corresponding to what she believes the experimenter sees from his position opposite her (above). Thus she shows her capacity for judging how perspective varies according to the position of the observer. Below, a close-up of experimental equipment used for this test. Using a variety of similar experiments, researchers at the Institute for the Sciences of Education in Geneva study the development of a child's thought processes. Opposite page, the little girl smilingly says goodbye to Institute psychologist.

stages of growth over the years. These experiments have already shown that the child first groups familiar objects or even geometrical elements into "logical classes" between the ages of four and seven. By pouring liquids from one glass to another, for example, he grasps the idea of a quantity which does not vary even if its appearance changes.

He understands concepts of length and number between the ages of five and seven. Weight and volume come later —between nine and twelve—and now the framework of his thought processes has been erected. At the age of ten, he begins to experiment and then, research shows, he is capable of scientific thinking at twelve when he starts formulating theories and searching for proofs.

As is often the case in science, the answers to the first questions have now raised new ones. For example, scientists now wonder if this development is the result of mental and nervous "maturing" or whether it is the fruit of education and just plain practice. Professor Piaget has already shown that external and internal factors always inter-act—that is, you cannot separate them. How this "inter-action" takes place is yet to be answered. There is also an even bigger question: how is the young child's mind, concentrated on the present and on what he can see and touch, transformed into the mind of the adolescent conscious of the world and capable of co-operating with his fellow men?

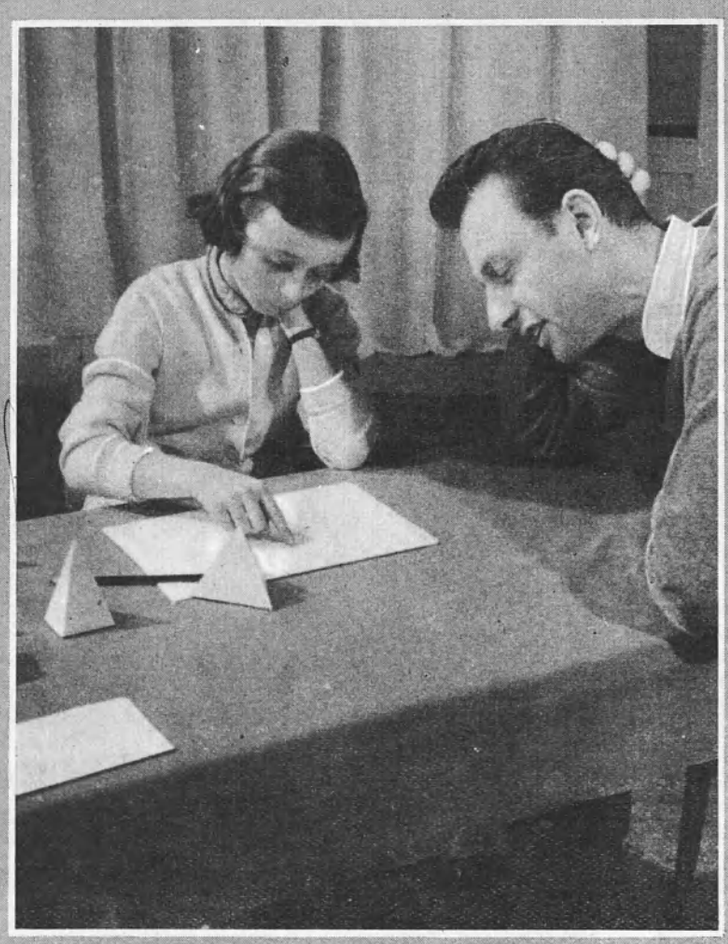
This is pure research at present, but Prof. Piaget and the Swiss scientists working with him believe that its results may represent a valuable contribution to education.

CUBES AND 'COVERED WAGGONS' TEST YOUNGSTERS' THINKING

PROFESSOR JEAN PIAGET, Co-Director of the Institute for the Sciences of Education and Director of the International Bureau of Education, Geneva. Prof. Piaget, who is Swiss, was formerly a member of the Executive Board of Unesco.

We are now paying more attention to children's feet than we do to their minds, a famous educator remarked some sixty years ago. In Geneva, the Institute of the Sciences of Education has set its sights on the child's mind. By direct observation it is trying to find out about the different stages in children's thinking and how a child passes from one stage to the other. Some of their techniques are shown here: (1 & 2) covered waggon-like apparatus is used to test girl's ability to understand the law of falling bodies along an inclined plane. Angle of chute (shaft of "covered waggon") is altered and child is asked to judge how far object will fall each time. (3) study of the concept of size. The object is to measure the height of a tower standing on a stool. The child is asked to build a tower of the same height on the ground; (4) the concept of volume. Child must construct houses with identical volumes on islands with different surface areas; (5 and 6) representation in two and three dimensions. Child draws on a plain sheet the opened-out surfaces of a geometrical solid she is shown.

WHO photos by Eric Schwab



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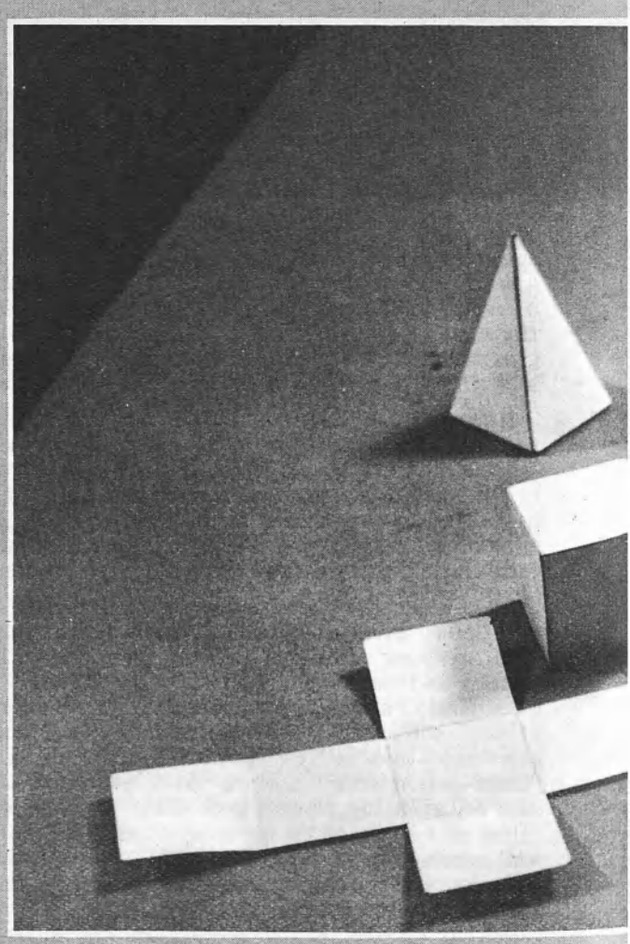

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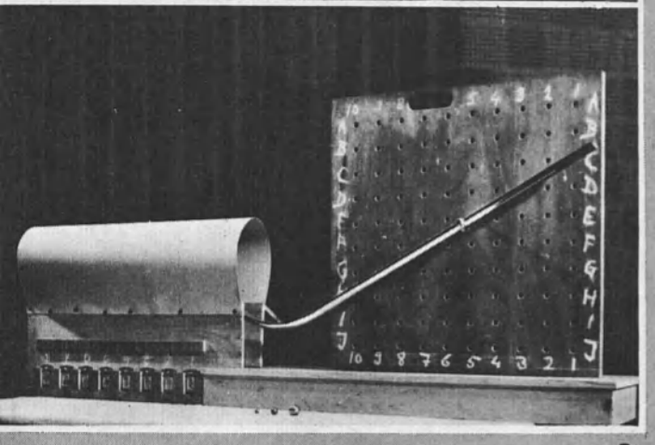

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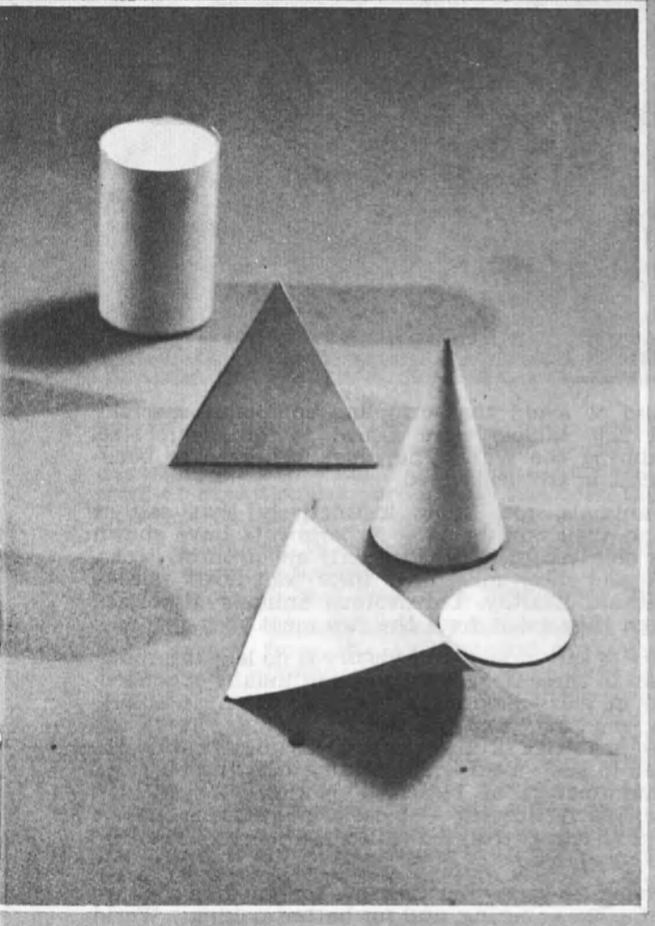

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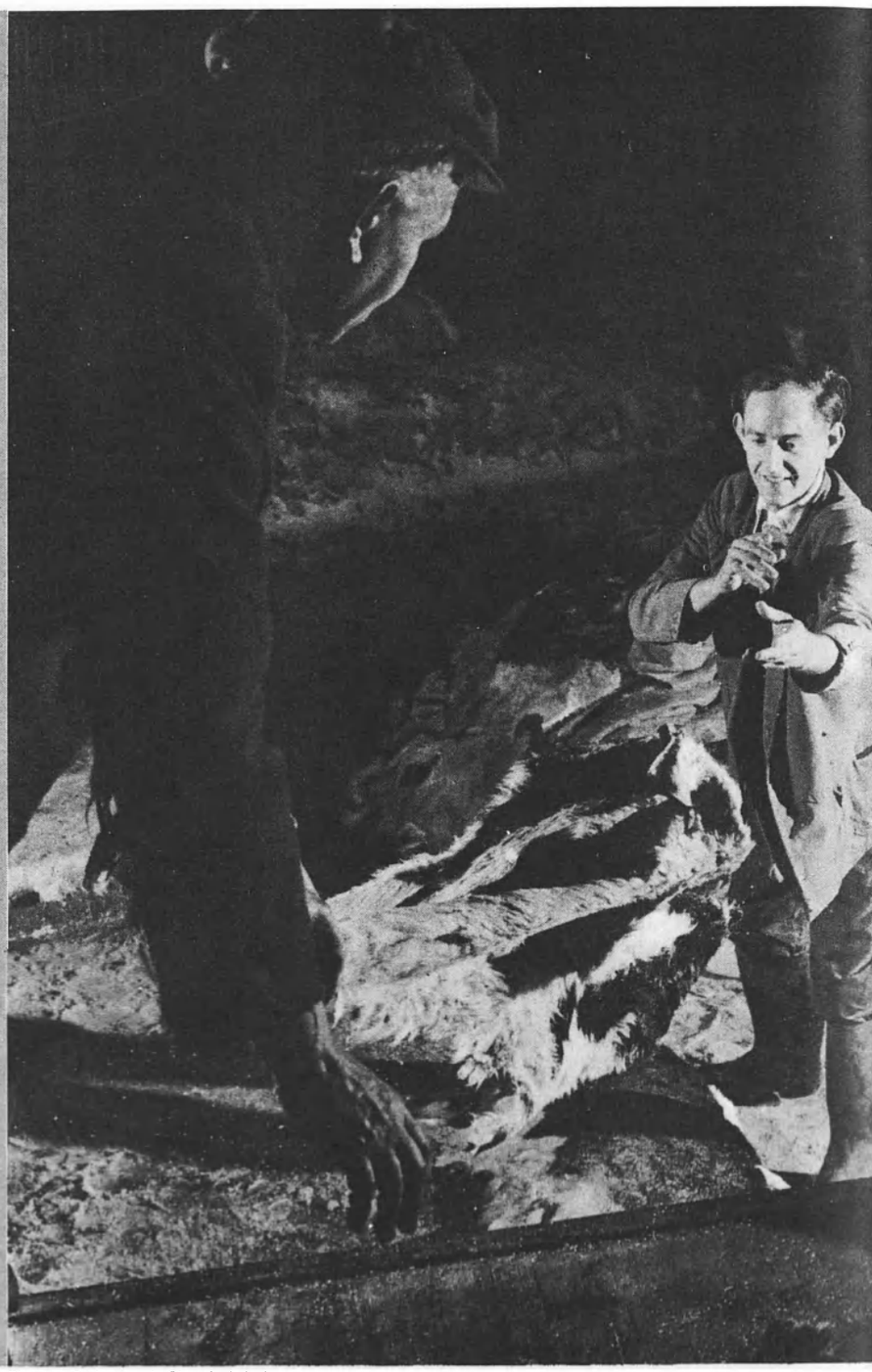
THE SALT OF LIFE

by Arthur Nettleton

Fellow of the Royal Geographical Society, London

Most people think of salt as being used mostly to season food in the kitchen, but this is one of the least important uses of salt. The largest users of salt are meat and fish packers, chemical industries, hide, textile and leather processors and soap manufacturers. Photo right, shows salt being used for skin curing; below, salt being mined deep underground.



Photos © Imperial Chemical Industries

Of all the substances found in the earth, few are more essential than common salt. If we were to be denied this natural compound the human race would die and much animal life would vanish. Without salt many modern industries would come to a halt.

Centuries ago it was recognized that to deprive a man of his salt was a sure way of causing his lingering death. Few could survive more than a month if subjected to complete salt starvation, and the sentence was a dreadful punishment.

Today medical science is making the reverse approach by investigating the uses of salt in fighting and curing ill health. Doctors are aware that the amount of salt introduced into the human body affects the adrenal glands, and controlling or omitting salt from the diet is a well-known treatment for kidney ailments.

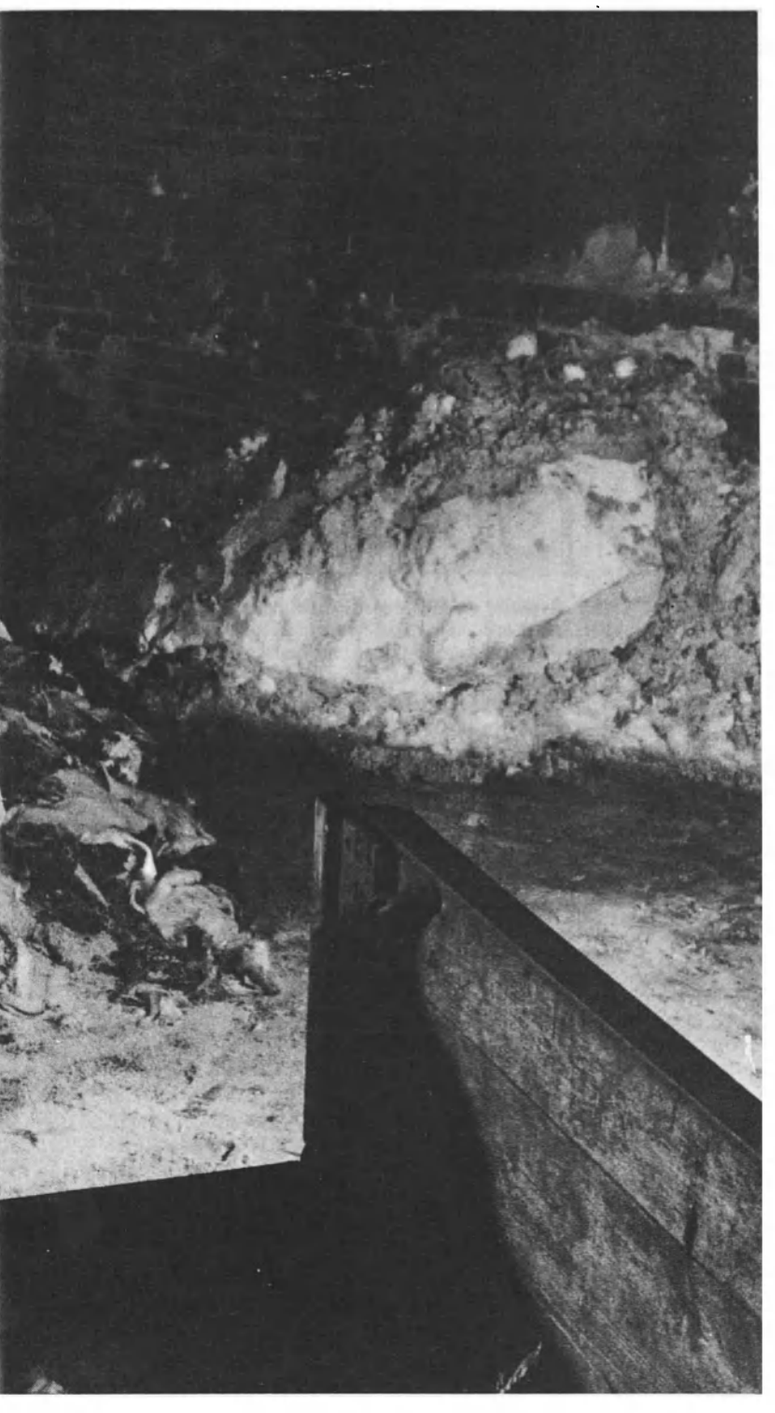
The importance of salt to health has certainly long been known to peoples who dwell in hot climates. Extra salt is needed to replace that lost from the body by profuse perspiration. Heat exhaustion and sunstroke are less likely if this precaution is taken.

Workers in heavy industries such as steel-making who perspire greatly, similarly require to replace their lost salt. Failure to do this is believed to be a cause of muscular cramp, and to avoid that crippling complaint specially flavoured salt tablets were issued to American steel workers during the War. The practice proved so beneficial that it is still continued.

Many animals, too, know instinctively that salt is essential to their well-being. Experiments have shown that dogs deprived of it can live only about three weeks, and cattle and sheep must have their "salt licks" if they are to remain healthy. Carnivorous animals also need salt, though they get it from the raw meat they eat.

The story of salt in modern industry is no less absorbing, and its uses in these fields are being continually expanded. It is used in glass-making, in the production of aluminium, in smelting, and in meat packing. It is the prime raw material of the modern chemical industries, and is used in soap-making, in refining fats and oils, and in the manufacture of bleaching powders, insecticides, fungicides, and fertilizers. The list of processes using salt is legion, and it can truly be called the most versatile of common compounds.

It is needed for water purification, for the manufacture of paper, for bacon curing, and for butter making. World consumption of salt is rapidly increasing, and production is being stepped up to meet the growing demand. Canada



opened a new rock salt mine near Windsor, Ontario, three years ago, and it has been equipped to produce 500 tons a day from a 27ft. seam 700ft. down. Another new salt seam of exceptionally pure quality has been tapped near Goderich, Ontario.

Salt production in Canada alone has trebled during the last 20 years. Altogether we need 20,000,000 tons a year for consumption and industries throughout the world.

Salt was so valuable in early times that it gave us our word salary, from the Latin *salarium*, meaning "salt money"—the allowance given Roman soldiers to buy salt. One of the oldest roads of Italy was called the *Via Salaria* (salt road) because it was the route by which salt was transported. Among the ancients, to "eat salt" with a man was to create a sacred bond of friendship, and this is still so with some Oriental peoples today. In the Middle Ages one's social rank was shown by whether one sat above or below the salt at table. In some parts of the world today salt is regarded as more to be coveted than money. Six pounds of salt was the only reward three Naga hillmen asked for building a church in Burma.

The value placed on this commodity may be gauged from the lengthy treks which take place regularly to the main salt markets. Tibetans descend from the "Roof of the World" to bring back a few pounds of salt, and one of the sights of the Sahara is the annual progression of camel caravans to the salt centre of Timbuktu, the fabulous city which founded its wealth on the salt trade centuries ago.

Salt has promoted learning, too. In its greatest days as a salt mart Timbuktu boasted large libraries, and was a major centre of education.

Agricultural scientists have experimented with salt as a soil dressing during the last 15 years, and much has been learned about its value as a crop improver. Tests have shown that if 3-5 hundredweights of salt are added to an acre of land, sugar beet grown there will yield that much extra sugar. American research has revealed that salt dressings make the beet stronger and more suitable for machine harvesting—an important point in these days of mechanized farming.

Salt refiners have also introduced a variety of salt specially suited to mechanical spreading. It is of uniform cubical structure, so that it passes freely through the spreader, and it does not readily blow from the surface of the soil.

Washing out the soil to make arid arable

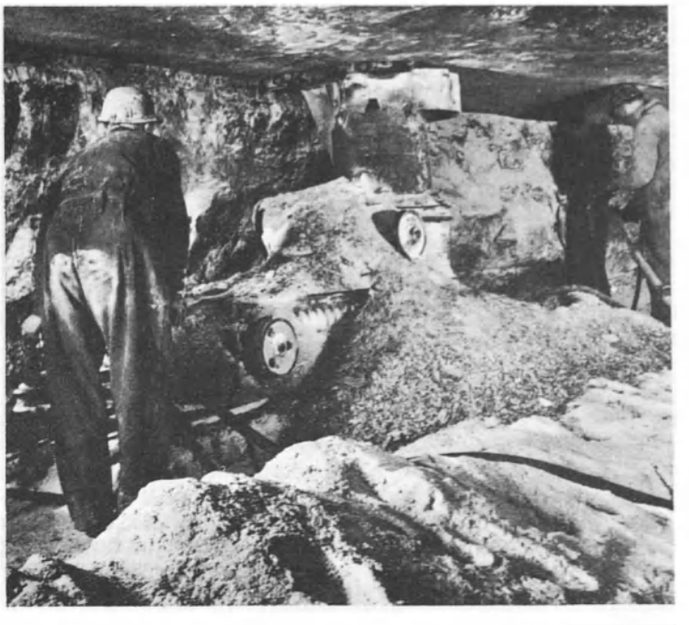
On the other hand, salt is far from being a complete boon to agriculture. An excess of this substance in the ground destroys the fertility of the soil, and some of the largest areas of arid land owe their sterility to an overabundance of salt.

Whereas the human body does not demur at one part of salt in each 1,000 parts of water, animals will normally drink a stronger saline solution than this. Most plants do not require much salt. If the soil becomes too salty, it is unsuitable for cultivation.

Lands once fertile have changed into deserts as the rivers irrigating them have impregnated the soil with salt. The water has evaporated and the salt it contained has been left behind, so that in course of time the region has been rendered unsuitable for crops. Research has shown that as much as four tons of salt per acre may accumulate in this way during a single year.

This negative aspect of salt and its uses is now being investigated by agriculturalists, soil scientists, chemists, and botanists. One of their aims is to determine whether projected sources of irrigation water, in areas it is hoped to reclaim for cultivation, are suitable for given crops on the type of soil concerned. Matching the crop to the salinity of the soil will be a vital factor in solving the problems of the world's arid regions, and the successful restoration of agriculture there over a period of time will depend largely on methods of draining off the water used for irrigation and washing soils impregnated with salt.

At the same time efforts are being made to produce varieties of useful plants which will thrive even if the soil



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THE SALT OF LIFE

(Continued)

is unusually salty. Botanists can help by providing plants which do not suffer under such conditions.

As to the sources for industrial salt and agricultural salt, it may be mined in rock form or obtained by evaporating brine from salt lakes or the sea. A third method is to dissolve the deposits of rock salt underground by introducing water through a bore-hole and then pumping this brine to the surface.

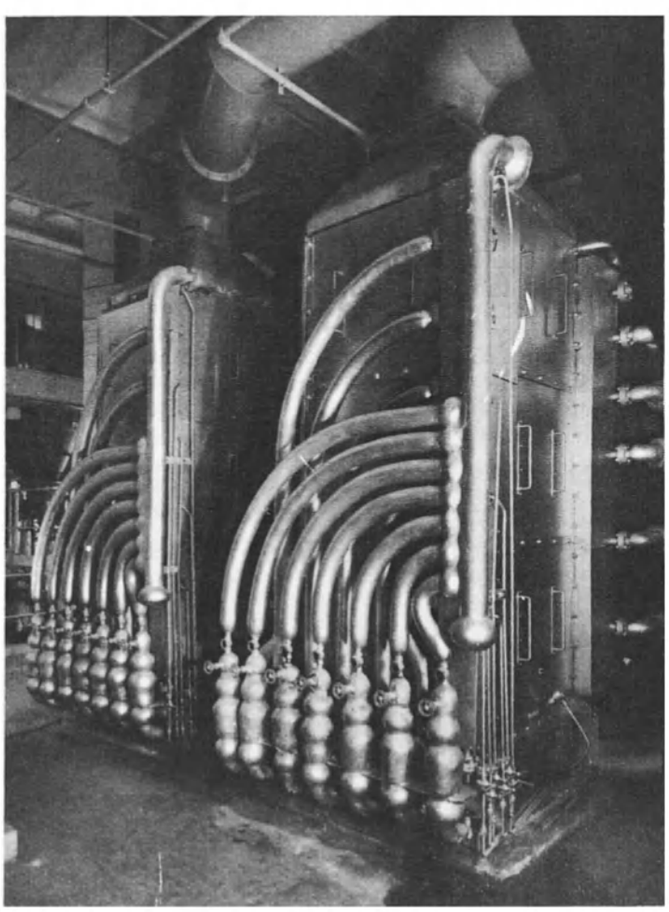
In the last-named case it was customary until recently to drill by percussion methods or by rotary shot, but the job has been speeded up by adopting the American oil well technique. Boring is done by high speed rotary bits in conjunction with a high pressure stream of liquid mud, which flushes the debris to the surface as it is produced.

Salt is being obtained through a bore-hole made in that way near the mouth of the River Tees, England, and the brine is being refined into table salt. By this method of drilling, a well 1,000ft. deep can be drilled in days instead of weeks.

The most extensive salt mines in the world, at Wieliczka, Poland, have been worked for centuries and still show no signs of becoming exhausted. The salt here is not high grade, being mixed with clay, but the deposits are more than 400 yards thick and the galleries have a total length of more than 500 miles.

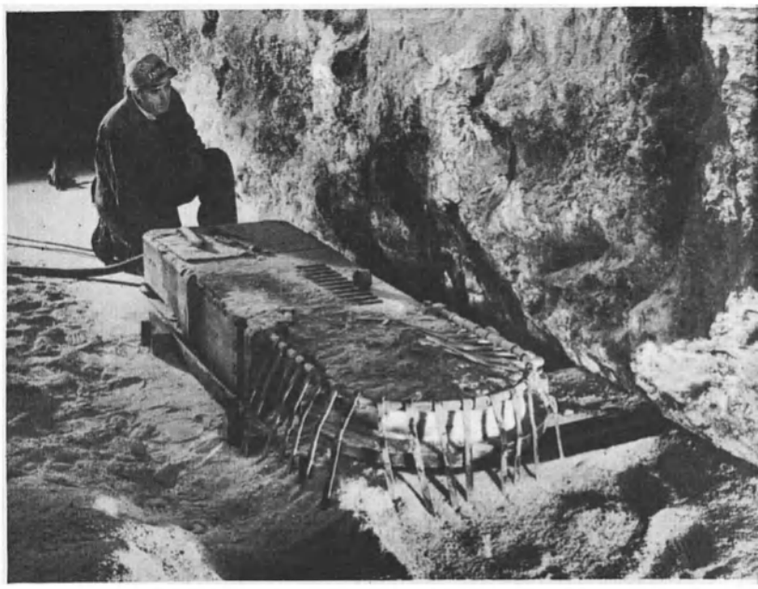
Deposits in Britain supply about one-tenth of the world's needs. Utah, America, has the largest salt lake in the world, 75 miles long and 20-50 miles wide, with brine one-sixth salt. The harvesting ponds to which the brine flows are the biggest salt pans in the world. Here the salt is obtained by evaporation.

Salt produced in Britain is similarly obtained mainly from brine, though the lakes are underground. Cheshire, England, has the strongest natural brine in the world. The liquid is evaporated in artificially heated pans, and the size of the crystals depends upon the speed of evaporation, fine salt being produced rapidly and coarse salt slowly.



Photos © Imperial Chemical Industries

UNDERGROUND LAKES & WELLS provide much of the salt for many countries. Those in Cheshire, England, have the strongest natural brine in the world, most of the salt produced in Britain being obtained from underground lakes. Above, this dryer with its battery of curved pipes removes the last traces of moisture from the salt.



COMMON SALT is found in the oceans, salt lakes, salt wells and salt mines. In almost every part of the world salt can be found in underground mines. Most lie far beneath the surface and the salt is mined like coal. Photo above shows rock salt being mined in Great Britain where deposits supply about one-tenth of the world's needs.

Some facts about salt are startling to the layman. Thus, if an active cell in a mild saline solution has its medium changed to one of pure water it swells and bursts. Saltless water kills a higher animal partly by causing the blood corpuscles to rupture and discharge potassium salts into the blood stream, and partly by stopping the kidneys from functioning—they cannot do so without salt. The burst blood cells also paralyze the heart, not only directly by the potassium, but also indirectly because they are no longer able to carry oxygen from the lungs.

A quarter ounce a day keeps the doctor away

It has been computed that the human body needs about ¼oz. of salt a day to keep it healthy. Among the functions of the salt we eat is the protection of the body against microbes; it has been found that serums which can kill bacteria are unable to do so if the salt is extracted.

Perhaps the strangest use for salt is in road building. America has a highway made of solid blocks of salt connecting Ithaca (New York) with the nearby airport, and this extraordinary highway has lasted 20 years without signs of serious deterioration.

London owes its situation indirectly to salt. Over 1,000 years ago Britain's salt mines supplied Western European countries, and on their way to the south coast of England the pack pony trains crossed the River Thames at a convenient ford near the present Westminster Bridge. Around the site of the ford a settlement grew up—the nucleus of the present city.

Today, despite the continually increasing demand for salt, the world is never likely to experience a shortage. Even in the inconceivable event of the salt mines and brine lakes becoming exhausted, the oceans contain enough of this vital commodity to meet our needs for thousands of years.

You do not have to take this statement with the proverbial "grain of salt." Seawater contains an average of three per cent of salt, and there are about 500,000,000 cubic miles of brine in the oceans of the world.

Clearly the name *common* salt is no misnomer, and its expanding uses today are not likely to be handicapped by any lack of the raw substance.

WHAT TIME IS IT?

A fictitious sun gives us the answer

by David Gunston

SINCE the very earliest times man has always been aware of the passing of time. It is something fundamental in life which, like space, we feel we understand but cannot easily define. Pulse beats, the movements of sun and moon, day and night, the tides, the changing seasons, youth and age—all these gave even primitive man this feeling of time's existence.

But although as we know from the evidence of the first sundials and the Egyptian water-clocks, he has long been interested in measuring the passage of time, human life got by quite well for many centuries without feeling the necessity of having a standard universal time. Cave men adjusted their lives according to the sun's movements, and so, basically, did civilized people until after the middle of the last century. Local time was all that mattered to the vast majority of the human race long after the perfection of mechanical timekeeping.

It was the development of railroad communications in North America that really led to the adoption of the universally recognized time system we know today. In Europe, English trains began to run to Greenwich time, French trains to Paris time, German trains to Berlin time. Local communities kept to their own mean sun time, and for a while it all worked fairly well.

But it was hardly to be expected that railroads extending their services over the Middle and Far West would adopt Washington time, which frequently differed by several hours from the local time of the regions they served. Owing to the vast E-W size of the American Continent the moment at which the sun appeared to pass immediately overhead at the meridian (noon) differed considerably in places of different longitude. So railroads in the United States actually started their own time, o with the longer lines, their own time zones.

As the system grew and more folk wanted to travel, this of course led to much confusion, especially at change-over stations, and it became obvious that a better solution would have to be found. The whole question of a standardized time-keeping system was discussed in conferences by the principal countries of the world during the years 1870-1880. Thanks primarily to scientists Charles F. Dowd in America and Sandford Fleming in Canada, a workable scheme was put forward and, after much debating, was finally adopted by the railroad companies of North America and eventually, in 1883-1884, by almost the entire civilized globe.

Stepping over a line makes today tomorrow

THE idea, like most good ones, was basically simple. There were to be accepted for the whole earth 24 standard meridians each 15° apart in longitude, for this purpose a meridian being taken to be an imaginary line circling the earth and passing through the poles. The prime meridian (0°), from which these were to be calculated was, by arbitrary agreement, that running through Greenwich, on the eastern fringe of London. Greenwich was partly chosen by way of international recognition of the importance of its famous Royal Observatory's contributions to astronomy and nautical science since its foundation by King Charles II in 1675.

Each longitudinal meridian was to be the centre of the one of the 24 fixed time zones each changing by one hour in passing to the next, back for westward from Greenwich, on for eastward. This also meant that at longitude 180° E. longitude 180° W. was also found, and so arose what is now known as the International Date Line and the convention of jumping a whole day of 24 hours when this point is crossed, gaining it in one direction and losing it in another. In practice, today, the Date Line does not keep strictly to the meridian, but curves round the Aleutian Islands and Fiji to enable the people of these, and neighbouring islands, to have the same day.

The advantages of this standard system were immediately obvious and now almost everywhere zone time based on Greenwich Mean Time (G.M.T.) is the rule. G.M.T. is kept all over Britain, and other countries have long adopted time zones corresponding to the selected meridians. Thus much of Europe keeps to Continental Time, 1 hour fast on Greenwich, while in North America the five time zones are used—Atlantic, Eastern, Central, Mountain and Pacific, respectively 4, 5, 6, 7 and 8 hours behind G.M.T. If New York preferred to adopt G.M.T., the sun would not be overhead until 5 p.m. Thus the system of "five hours back" is the answer. Certainly it is infinitely better than the chaos of 80 years ago, when there were almost as many time meridians as there were railroad companies.

Modern time begins at the G in G.M.T.

SO, in the strictly practical sense, Greenwich is the place where modern time begins. In point of fact, the Royal Observatory has now moved to the village of Hurstmonceux (pronounced Hurst-*mon*-soo) near Eastbourne, Sussex, on the South Coast of England, but as this place is close to the Greenwich meridian and allowance is made for the difference, the change in no way affects the validity of Greenwich Mean Time.

So far, however, we have been concerned with what is termed the mean solar day based upon arbitrary meridians. This would be completely accurate and useful if the earth and the sun were bodies rigidly accurate in their motions. But things are not quite so easy as that. The earth itself is tilted on its axis at an angle of 23½° from vertical, and its path round the sun is elliptical, not circular. What, then, are the basic concepts for the measurement of time?

All our sense of time is bound up with some movement, whether it be the sun in the sky or the hands on the face of a clock. But movement requires space, so it is evident at once that time and space are closely related, though of course if measuring time is one thing, defining it precisely is quite another. Indeed, the world's metaphysicians are still not entirely agreed upon a definition of time, which may therefore be long delayed.

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WHAT TIME IS IT?

(Continued)

On the scientific level, however, all our measurements of time depend primarily on the movement of the earth spinning round on its axis, and round the sun—the first enabling us to count off successive days, the second successive years. Thus we see clearly why time-measuring has always been an important part of practical astronomy. Why, in fact, what we call "the right time" is originally given to the world by observatories and not by railroad stations or shipping offices.

To tell the time of day we need first of all a moment at which we consider each day to begin. Whereas for civil purposes in our daily lives this point is taken to be midnight, the natural day commences at noon that is, when the sun crosses the meridian. But the intervals between successive noons throughout the year as measured by this method are far from equal, because of the eccentricities of the earth's behaviour in space. The daily errors mount up, and clocks set solely by the sun would be hours wrong within months. The sun is, in fact, not a particularly good timekeeper.

If instead of using the sun we measure time by the apparent daytime movement of the stars no such inequalities are noticeable. Star time, thus obtained, is called Sidereal Time and for strictly scientific use, as in astronomy, it is the only true time. Why should this be so? When compared with our sun the stars are infinitely distant, and even when the earth moves round the sun for say six months to occupy a position in space which has changed by nearly 200 million miles, the apparent position to us of the stars has changed only by amounts too infinitesimally small to affect earthly calculations to any important degree.

So, aware of these basic errors in solar time, the system of Mean Time had to be introduced, which is based on the movements of a fictitious sun which gives us every day of exactly the same length and equal to the apparent length of the solar day. Mean Time can best be defined by the going of a perfect clock which is so set that, in the average (mean) of the whole year, it shall be as much ahead of solar time as behind it.

Most accurate 'clock' gains twelve hours in six months

THE greatest difference between clock and sun would then be about 16 minutes, occurring in one direction early in November and in the other about the middle of February. This vital difference is called the Equation of Time, and it represents (from a highly accurate astronomical point of view, only roughly) the difference between apparent solar time and G.M.T. This data is given for each day in Nautical and Domestic Almanacs, thus enabling domestic clocks and ship's chronometers to be set by the sun. Wherever reasonably exact time is of importance, a similar system to this is in use.

For the astronomer, Sidereal Time is of the utmost importance. He reads it by measuring the daily motion of that point in the equator from which the true right ascension of the stars is reckoned—what he calls the vernal equinox. Two upper transits of this over the same meridian determine a sidereal day, which is actually shorter than a mean solar day:

1 Mean Solar Day = 24 hrs. 3 mins. 56.5554 seconds, sidereal time.

1 Sidereal Day = 23 hrs. 56 mins. 4.091 seconds, mean solar time.

When he is about to make time observations the astronomer sets his telescope at the proper angle to watch the passage of the star across the meridian. His instrument has between 5 and 11 spider-lines ruled across its glass, the centre one set on the meridian. He records on a chronograph, or highly precise stop-watch, the star's transit over each line by interrupting his electric circuit with a hand-held key, which itself is connected electrically to the chronograph and on which a break-circuit chronometer is making a continuous record. The chronograph sheet can afterwards easily be interpreted, and Sidereal Time calculated. A sidereal clock, however, is useless for ordinary day-to-day timekeeping, since it gains 12 hours on an ordinary clock in 6 months.

Ordinarily speaking, we must still live our lives by the sun, getting up around sunrise and going to bed when darkness has fallen. So we must have a practical system based on the sun, and the thing works better if we replace the unreliable real sun by this imaginary (mean) sun, which crosses the meridian at uniform intervals and goes round the equator at a fixed rate adjusted so that the real sun and itself each take exactly one year to make the circuit.

Quartz crystal clock keeps time to 1/1,000th of a second

THIS man-devised compromise brings us back to Greenwich and its long-proved Mean Time, which is actually the Greenwich Hour Angle of the mean sun, plus 12 hours to make the day begin at midnight. And as such it meets all the needs of the ordinary world—though of course under zone time systems the true (sun) time is applicable only exactly on the meridians, which however causes little inconvenience in practice.

The famous old Royal Observatory at Greenwich suffered some bomb damage in World War II, but it was moved from London chiefly because that city's brilliant street-lighting (unknown in Charles II's day) had made night-sky observations and long-exposure photography practically impossible. The move to Hurstmonceux Castle, "the most perfect example of the mansion of a feudal lord in the South of England," and built in 1446, is now almost complete, but the new Observatory still retains its ancient description of Royal Greenwich Observatory.

Six telescope domes—one for the new 100-inch "Isaac Newton"—and modern office blocks now ring the Tudor turrets, but all the old work of time-keeping and astronomical observation continues and is expanding in ideal surroundings and with up-to-date equipment. The well-known Greenwich Time Signal, or "pips," is still broadcast to the world every 15 mins. from an astronomical "Regulator" radio clock governed by a quartz crystal clock. This is constantly checked and compared with the time signals of Paris and elsewhere, so that it and all the Observatory clocks keep time to within 1/1,000th of a second per day.

Before the telegraph was invented, observatories gave their time signals by bell-ringing, whistle-blowing and the dropping of elevated time-ball signals on their towers, but nowadays G.M.T. is relayed by radio continuously all over the globe for the benefit of other observatories, radio stations, ships and aircraft. Any individual or traveller with suitable radio receiving equipment can receive a time-signal over the ether correct to within 1/100th of a second, but in general it is the ordinary broadcasting stations which perform the most public service by regularly issuing time checks. The U.S. Navy Observatory at Georgetown Heights, Washington, however, accepts no responsibility for time signals other than its own, and every day at noon still uses a time-ball, as well as automatically correcting all the clocks in the Government Buildings there.

As you will have seen, time-keeping is a trickier business than it at first seems, but it has now been perfected as much as is humanly possible. It's not often science's fault if you are late for an appointment!

Almost all of central Rotterdam was razed to the ground by a single bombing attack on May 14, 1940 and by the great fire which followed. Today Rotterdam is one of the most imposing cities in the Western world, with fine modern buildings, a simple yet daring architectural style, spacious avenues, and works of art, which are all strikingly integrated into the new urbanization plan. Left, "Construction", a motif in metal by the sculptor Naum Gabo which stands on the Coolsingel, Rotterdam's "Champs-Elysées".

All photos Lies Wiegman © Agence de Diffusion Internationale

MIRACLE AT ROTTERDAM

by Michel Salmon

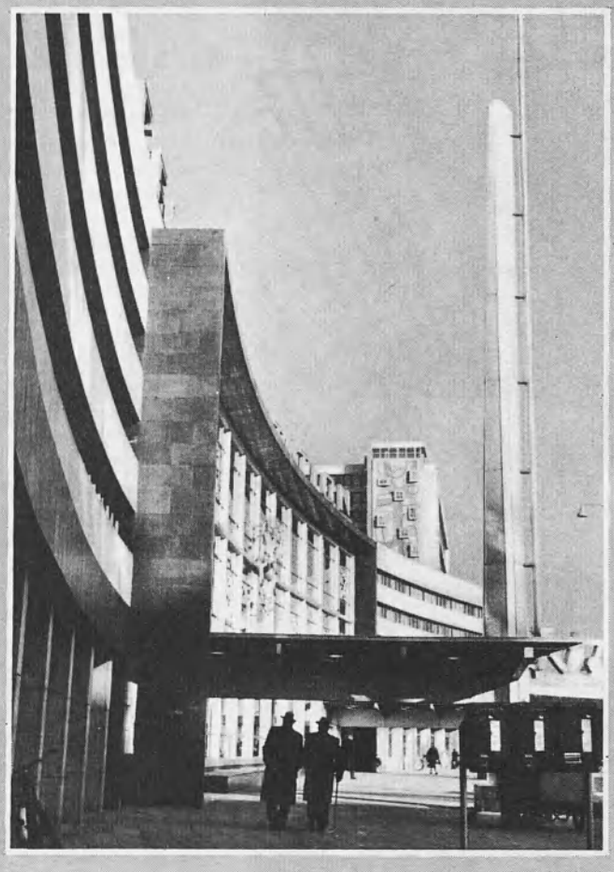
I love Rotterdam as some people love rain or the blustering wind or cold, stimulating weather that quickens one to activity. There is a good reason for comparing it with the weather. The sea is Rotterdam's cradle; it is the backcloth to its great stage crowded with docks, houses, esplanades and factories on which rain, wind and cold often appear as actors and "extras."

But Rotterdam also has its ruins, or rather its memories of ruins—clean and tidy sites from which rubble has been carefully cleared. "Rotterdam has not yet recovered from its wounds, but the scars are not too unsightly," my friends in Rotterdam say, with a smile. Yet wounds like these take a long time to heal; a town can be destroyed in a few hours, but takes a decade or more to rebuild.

And now I am back in the centre of the city, walking down the Coolsingel—the "Champs-Elysées" of Rotterdam. It looks futuristic with its fountains, striking statues, parks, large new buildings and houses, its model shops and its glittering cinemas—

MIRACLE AT ROTTERDAM

(Continued)



ingenious combinations of glass, aluminium, stucco and lights. The crowds surge and hurry along, and everywhere there is a smell of roasting coffee, petrol and freshly laid cement.

At the liberation, on May 5, 1945, more than 20,000 of Rotterdam's citizens had been killed by the Nazis. Nearly 800 of these perished in the bombing of May, 1940.

As a result of the raid 11,000 buildings were destroyed, and 25,000 families, or 80,000 people were left homeless. Altogether, 2,393 shops, 1,500 offices, 1,212 factories and mills, 675 warehouses, 526 restaurants and cafés, 184 garages, 69 schools, 21 churches, 12 cinemas, 6 concert halls, 4 hospitals, the 4 stations, 2 theatres and 2 museums were reduced to ashes. Over an area of 642 acres everything was reduced to dust. There was nothing left of the centre of the city or of the old harbour, so dear to novelists of the sea, from Conrad to Cendrars.

On that tragic May 14, Rotterdam was set on fire by incendiary bombs. High explosive bombs had already destroyed the water mains and the firemen were unable to stop the blaze from spreading. Rotterdam burned for forty days and forty nights. When the last fire had burned itself out there were over 6,000 million cubic feet of rubble to be cleared away.

In the ensuing weeks and months, workmen had to dig out of the ground, like so many stumps of decayed teeth, 160,000 foundation piles, of a total length of 1,240 miles—as far as from London to Moscow. (The soil in Rotterdam is so loose and damp that buildings have to be set on a foundation of piles.)

Mijnheer W.G. Witteveen, the chief architect of Rotterdam, found a room in the municipal library, which was still standing, and began to work feverishly on a plan for the rebuilding. Though no rebuilding was permitted during the occupation. The famous Witteveen plan became a kind of a symbol—and never was a secret so well and yet so badly kept. The whole town knew of it ; and the thought of the garden-cities and skyscrapers to be, made destruction, hunger and fear seem less terrible.

I do not know how much of the Witteveen plan there is in the Rotterdam of today. I have watched the city recover; and, every time I have come back, there has been still more feverish activity, with scaffolding everywhere and the suburbs spreading outwards in all directions, so that it gives the impression of a new city "sprung up overnight," rather than an old city rebuilt.

All I know is that in July 1959, Rotterdam is one of the most impressive cities in the West. From the top of the *Groothandelsgebouw,* one of the biggest commercial buildings in the world (it has 11 storeys and is 720 feet long and 280 wide), you can see that a master plan has been followed. In the background is the harbour, with its stately lines of ships anchored at the docks, its forest of cranes, hoists and oil-cracking towers (the native of Rotterdam tends to think first of the harbour and then of the city beside it). And from the harbour to the polders delimiting the city to the north, south and east, the 1,980 acres of this town of 750,000 souls is divided up into broad avenues, huge squares and compact blocks of modern houses with green spaces

between them. (Almost 70% of the area of Rotterdam consists of open spaces)

This is architecture on a humanistic level, architecture to the measure of man, resisting the temptation to build on a colossal scale and yet not infected by the nostalgic conservatism which thinks it sacrilege to touch what is old, even though it be a slum.

On the "Coolsingel" is the massive, Mycenaean cube of the "Bijenkorf", a department store designed by A Elzas, of the Netherlands, Marcel Breuer, of the U.S.A., (one of the three architects who planned the new UNESCO Headquarters building) and another American, Daniel Schwartzman. At every turn you find a masterpiece of modern art—a fresco by Louis Van Roode on the wall of the post-office; a bronze by Marino Marini, taut as a bow on the "Zuidplein"; in the station hall a sinister-looking rock with the beauty of a black diamond, carved by Umberto Mastroianni; an animal group by Anne Grimdalen in front of the Town Hall; and of course Zadkine's touching statue, symbolizing the desecration and resurgence of the city.

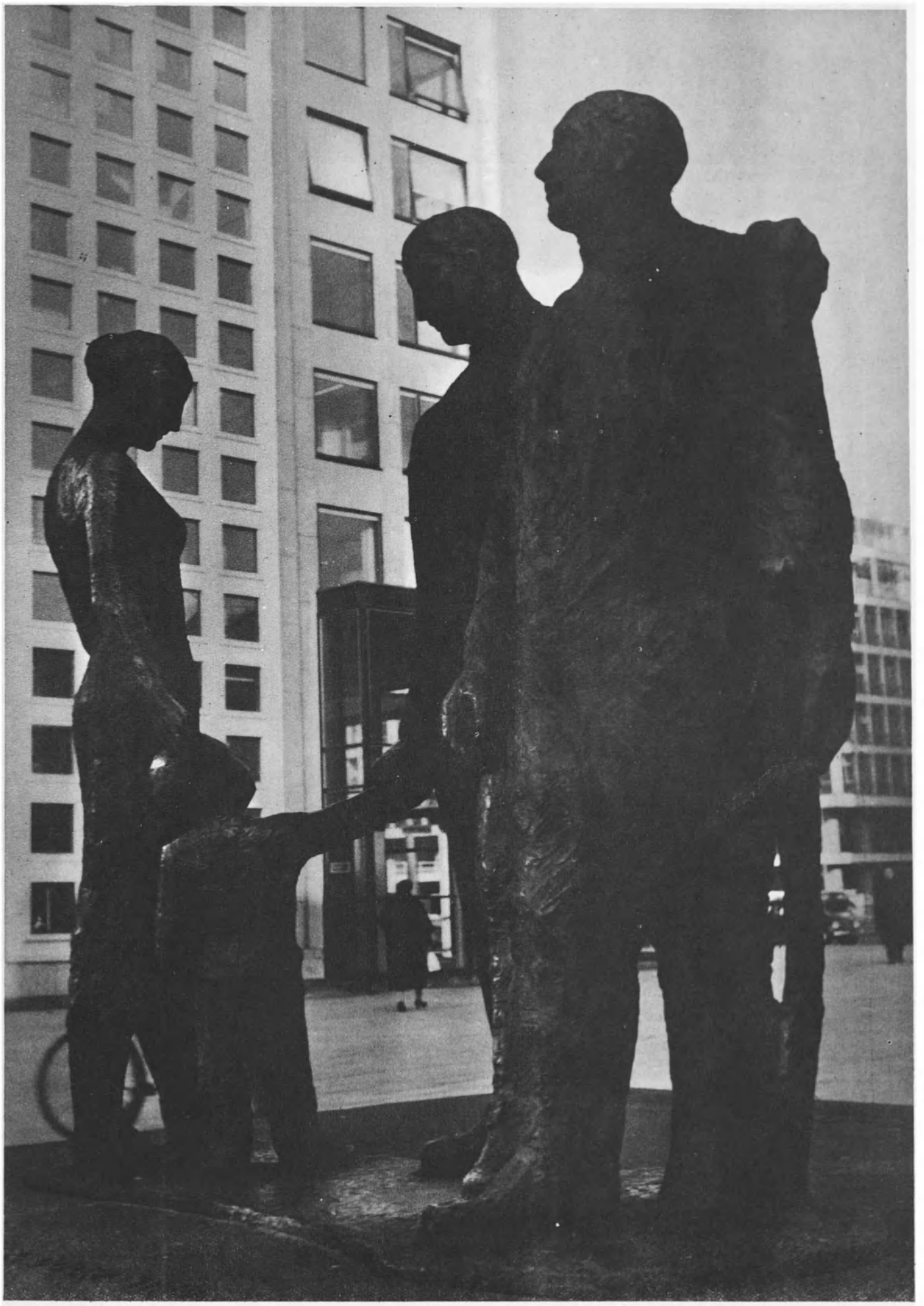
Rotterdam has opened its doors to a "League of Nations" of architects, decorators and sculptors. From all over the world they have come, and have created here a universal idiom for the cities of the XXIst century. It is a triumph of internationalism, in both mind and heart. It is a triumph of understanding and international cooperation, in this great seaport opening onto adventure the wide world over, and teaches the sceptical the lesson that miracles can be worked by determination.

CITY OF AIR, LIGHT & WIDE OPEN SPACES

The new Rotterdam which has risen from the ashes of war is a city of air, light and wide open spaces. In the heart of town, shown in this panoramic view, seventy per cent of the total area has been reserved for open spaces, compared with some 45% in the pre-war city. Though the area available for building sites has been nearly halved, the erection of taller buildings—made possible by new, wider roads—and a more rational use of space, has kept the building volume virtually unchanged. In this photo, taken in 1957, work was still being carried out on the Central Station (left) and on the Post Office building (left, background). Completed station is seen in photo, opposite page. Other important buildings visible in rooftop view of Rotterdam: old town hall with its tower and new 14-storey blocks of flats. In planning urbanization, city authorities kept area on right of photo clear for future development. New projects include a hotel, a vast office building and a concert hall.

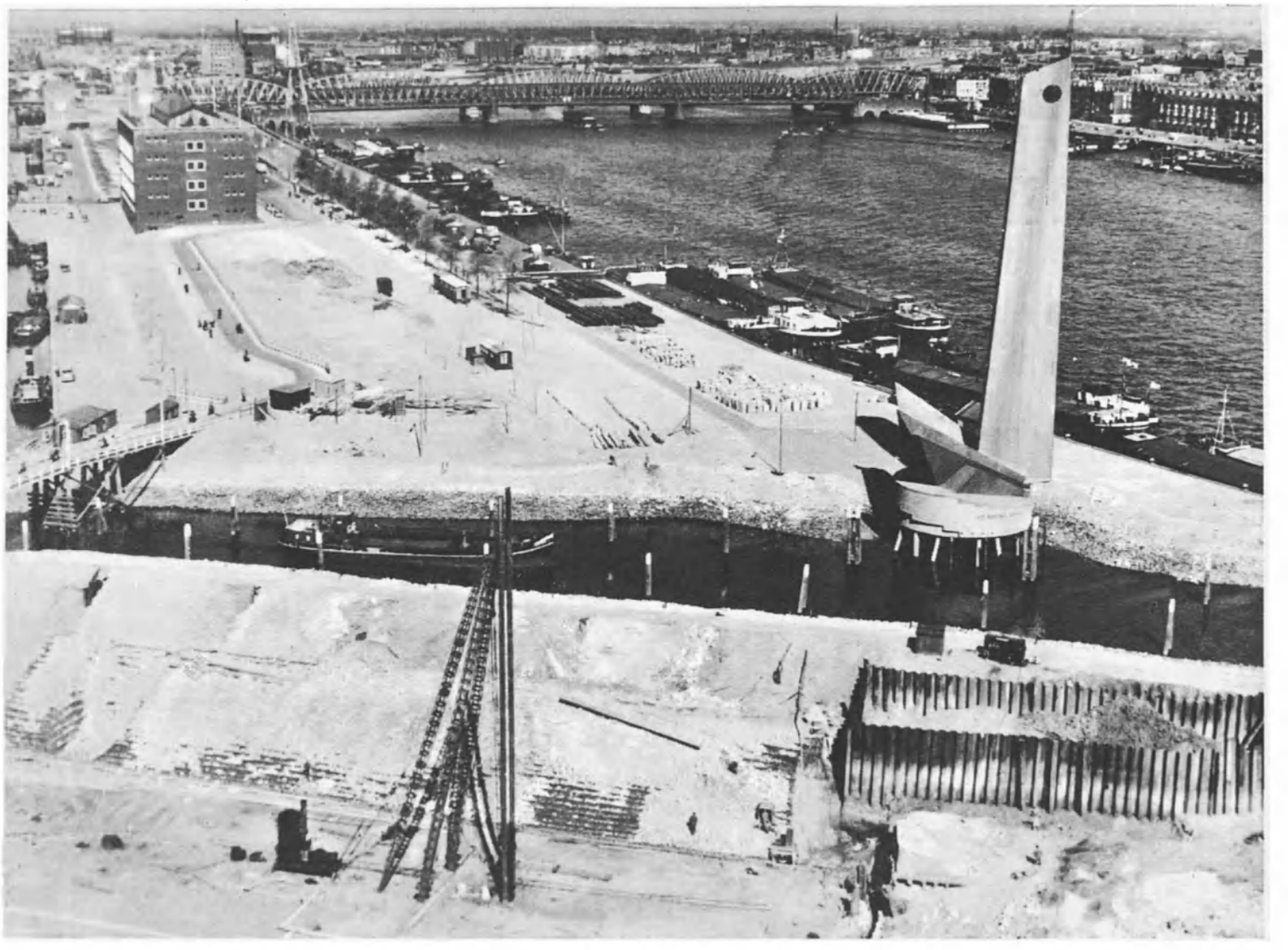
SYMPHONY OF ART AND ARCHITECTURE

A symphony in concrete, glass and stone, the new office buildings and appartment houses of Rotterdam glisten in the afternoon sun. The Rotterdam of today can truly be said to be both beautiful and functional for its architects have added to the basic utilitarianism of their designs the varied works of decorators, sculptors and other artists of different schools. The whole destroyed area of Rotterdam was requisitioned by the municipality to make a centralized planning scheme. Former property owners were given options on new building sites, but could claim compensation only if they used the full amount for rebuilding. The result has been a rational growth of shops and buildings (left and below left). Underneath the great blocks of flats are a variety of small shops which have brought the shopping public back again to the heart of Rotterdam. Amid all these transformations, those who died in the holocaust of May 1940 and throughout the war years are not forgotten. In the Stadhuisplein now stands a memorial to the victims of war—a group of massively-hewn figures by the sculptor Mari Andriessen (right and below).



ART IS REBORN AS THE CITY RISES AGAIN

The works of modern art which decorate the streets and squares of Rotterdam are a triumph of international co-operation, coming as they do from the hands of artists of many lands. Many of these works have been erected as testimonies to Rotterdam's destruction and suffering. In the Zuidplein, which is destined to become the new cultural centre of south Rotterdam, stands "Il Grande Miracolo" (left) a bronze by the Italian sculptor Marino Marini, in honour of Rotterdam's war victims. Centre, a group of bear cubs at play—the work of Anne Grimalden of the Netherlands. In the background is the City Hall with its tall tower—one of the few buildings which escaped complete destruction in the bombardment of 1940. Since the city was reconstructed this building has been thrown into new-found prominence by the widening of the pavement in front of it and the construction of a new square opening in the Coolsingel Boulevard. Further along this sweeping boulevard is a small yet poignant reminder to those who pass of the city's past ordeals—the statue of a mother shielding a child as walls crumble around her.



HARBOUR FLANKED BY A CITY

The people of Rotterdam tend to think of their town as "a port surrounded by a city", for Rotterdam is the Netherland's chief port and the second largest in the world. Extensively damaged in 1944, it was back in working order only six months after VE Day. Photo, above, shows the River Maas. An embankment and a broad boulevard have been laid out and a new inland shipping lane extends right to the city centre. Monument at right, "The Bow" is for war victims of the merchant navy. Below, two views of central Rotterdam.

ELECTRONIC TRANSLATORS WITH BUILT-IN DICTIONARIES

by Emile Delavenay

THE idea that an electronic machine should be able to do automatically all or part of a translator's work—consult a dictionary or translate a written text from one language into another—may seem fantastic at first sight.

Yet the idea has been gaining ground ever since it was first put forward by an Englishman, A.D. Booth, in 1946; and today the goal is almost in sight for the many British, American and Soviet scientists who have been working on this problem for the past twelve years.

Automatic digital computers were invented to carry out at high speed *sequences of arithmetic operations* which would have been too time-consuming for human beings and which involved too great a risk of error. They have proved that they can solve problems of industrial and business management which, in addition to *automatic computing*, call for certain *logical decisions*.

In both cases—scientific calculation and business management (of which operational research is one aspect) —the machine receives two types of *information:* numerical information in digital form, and alphabetical information—i.e. words in current use fed in as letters of the alphabet. It automatically converts both types of information into a *code* suited to the particular operations it has to perform.

These include, for example, the logical identification of a quantity or a word with its equivalent stored in an electronic memory; automatic computation; the shifting of partial results from one memory to another; the selection of instructions depending on the type of result obtained; and lastly, the "output" of the final result, which may be in typewritten form. The most important feature of these machines is their breath-taking speed: some operations are performed in a millionth of a second.

Automatic translation could be envisaged as the following sequence of lightning operations without human intervention: feeding of a word into the machine, looking up and identification of the word in the electronic dictionary, simultaneous identification of the word's equivalent in the second language, and finally typing of this equivalent. The electronic dictionary is therefore a bilingual dictionary—like those used for ordinary translating—but recorded in a magnetic memory.

★

THIS series of very simple operations is only suitable, however, for words recorded in the dictionary in the same form as they appear in the sentences—i.e. invariable words—and which, moreover, have only one meanlng. Special problems are raised by variable words, by those having several different meanings, and also by the word-order, and by idioms, or expressions whose general sense is different from the sum of meanlngs conveyed by the individual words.

In Britain, the United States, the U.S.S.R. and Japan, research has therefore concentrated for a number of years on the problems raised by the variable forms of words, by syntax, idioms and words with multiple meanings. Russian, English, German, French, Hungarian, Norwegian, Arabic, Chinese and Japanese have been analyzed for the purpose of reducing all the facts and rules of each language to *algorithms*, or numerical systems enabling the machine to translate sentences from language A into language B.

Highly complex programmes have been worked out which may involve up to ten thousand logical operations for the translation of a twenty-word sentence. Yet even so, the speed of the machine is such that the process is faster than ordinary translation. Just as the digital computer consults tables of logarithms or of functions, so the automatic translator will consult grammatical, morphological or syntactical tables in addition to its electronic dictionary. It scans tables of prepositions, tenses of verbs, declensions or conjugations—doing in fact the same work as the translator has to do when deciphering a text in a complex foreign language. These tables and the dictionary are made up of series of digits representing the algorithms of the input and output languages.

Before the facts of language could be reduced to algorithms, it was necessary to discover certain rules overlooked in the old type of grammar, because these grammar books were written for thinking human beings and not for unconscious machines which can only recognize explicit signals.

★

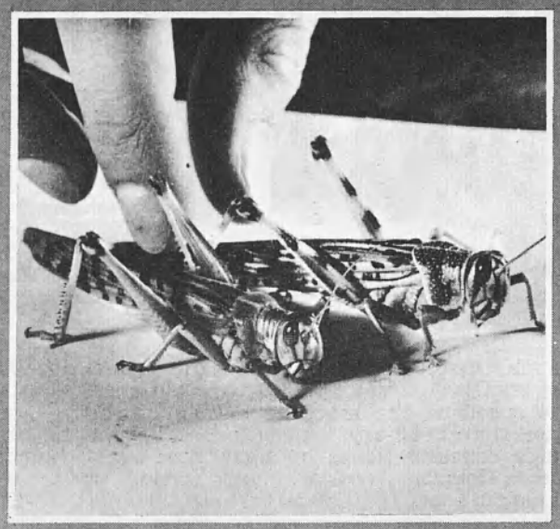
THUS research to put translation on an automatic basis is opening up new vistas for the linguist. It is leading to various kinds of studies on "signalling" systems of spoken and written language. Each language is being studied scientifically, in the minutest detail, and valid mechanical criteria are being discovered for the understanding of sentences—a field in which intuition might well have been thought the only possible guide.

The day of the translation machine is not far off, but much still remains to be done. Electronic machines can translate, but men have not yet learned to exploit their amazing potential. It is now up to the linguists —those of today who can and must adapt themselves to the new world of electronics, and those of to-morrow who, with the help of machines, will extend the scope of linguistics to cover all languages and all aspects of language. For the linguistic research required to perfect a translation machine is impossible without the aid of ultra-rapid new machinery.

The future belongs to the linguists and mathematicians, the "programmers", who can grasp the behaviour of words in a sentence, as well as language statistics and the working methods of computers. As in automatic computing and in management by computer, the machine can only perform automatic and repetitive operations. All the creative work, the most important task, will devolve upon man; he must use his imagination and judgement to work out programmes which the machine will then perform blindly and unconsciously.

For all sorts of reasons, scientific texts are the first which can and should be submitted to the special analysis required for automatic translation. Up till now, research by American, British and Soviet scientists has been concerned with texts dealing with mathematics, chemistry, electronics and plant genetics. The need for scientific translations is such in all countries that we cannot even begin to solve this problem without the help of machines.

But will machines ever be able to translate "literary" texts? The more optimistic research workers are beginning to hope so, and already have notions of the way to set about it. When this day comes, when all prose works can be translated automatically at scarcely believable speeds (there is talk of 20,000 words an hour), the peoples of the world will truly be able to learn about one another and appreciate each other's scientific and literary riches.

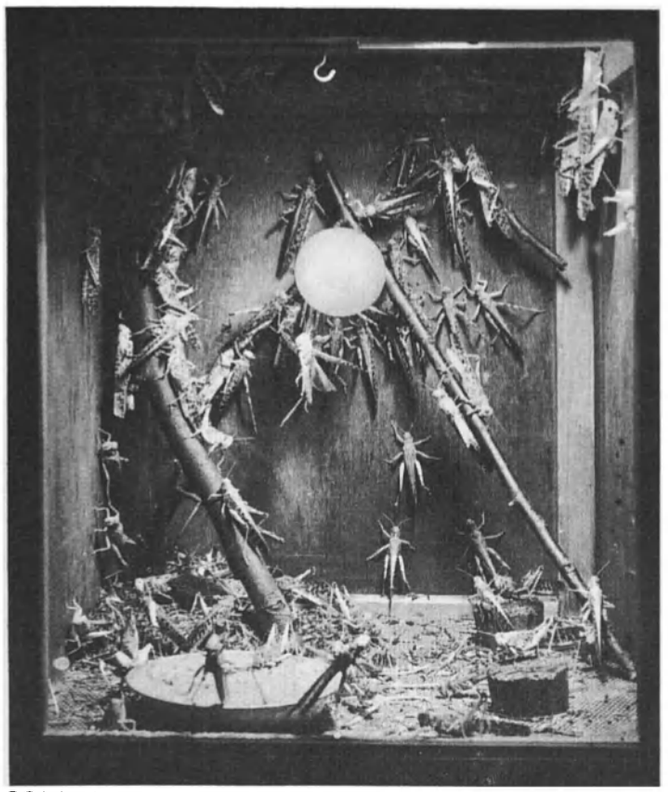


COI London

A DESERT IN THE HEART OF LONDON

by Daniel Behrman

UNATIONS



C.O.I. London

There may be a "pea-soup" fog or a sharp frost outside, but at the Anti-Locust Research Centre in the heart of London, a hot desert exists all year round. Here a million locusts are bred annually and their behaviour studied to help the world fight against locust invasions. Left, locusts are bred in the laboratory where they are induced to lay their eggs in aluminium tubes. Eggs are about the size of a wheat seed, laid in batches of 40 to 100 in moist sand in a pencil-shaped burrow. A glue-like substance holds them and the sand grains together (below). Larger cages at laboratory (above) hold adult locusts, fed on fresh grass and bran. Large electric light bulb replaces sun; sticks, for climbing and to fly from, give recreation. Full generation takes three months.

UNATIONS

Just the other day, an alert English lady with an interest in zoology breathlessly brought a *schistocerca gregaria* into a London police station.

"It's a desert locust," she told the sergeant on duty, "I found it in Hyde Park."

When news of the discovery reached the Anti-Locust Research Centre in London, the man who is perhaps the world's leading authority on locusts, Dr. B.P. Uvarov, merely remarked:

"Why not? We raise a million desert locusts a year across the road from Hyde Park . . . and some of them are bound to get away."

Dr. Uvarov is not worried because he knows they do so at their own risk. For the desert locust does not stand a chance of surviving in the English climate. Unfortunately, in an area covering no less than 11,000,000 square miles of the earth's surface, it not only survives but flourishes to the point where it is an epidemic plague—and such a plague is now afflicting much of Africa and Asia.

Desert locusts in swarms have been known to darken the sky as far west as the Canary Islands in the Atlantic Ocean and as far east as Assam. They ravage North and East Africa and even fan out south to Tanganyika and northward to Spain and Portugal. Every year, the Anti-Locust Research Centre estimates, they do £30,000,000 worth of damage to cash crops in some 65 countries. No estimate, however, can be made of the harvest of suffering and starvation they sow in the arid and semi-arid belts of Africa and Asia.

The Anti-Locust Research Centre, operated by the British Government, has been in existence for fifteen years, but Dr. Uvarov has spent most of his life with locusts. In his office overlooking Hyde Park, Dr. Uvarov stated the centre's objective in few and clear words:

"We want to find out what conditions produce the initial swarms which cause all the trouble and then, if possible, we want to find out if these conditions can be changed economically."

Africa freed from two plagues

When Dr. Uvarov first began to study locusts (they interested him even as a small boy), there were three main species plaguing Asia and Africa: the red locust, the migratory locust and the desert locust. In 1929, a locust invasion of the Middle East led to the birth of the predecessor of the present-day research centre. Then, it was only Dr. Uvarov and an assistant.

But, even thirty years ago, Dr. Uvarov was already preaching that "locusts ignore boundaries" and the scope of his work quickly became international. He and his collaborators attacked the problem from all sides: biological, geographical, physiological and meteorological.

It was the most unglamorous side of the job—the patient collecting of locust reports, and plotting them on maps—which led to their first victory. Once records covering a sufficiently long period had been analyzed geographically (evidence of the desert locust goes back more than 2,000 years), they showed that swarms of the migratory locust started in what is now the Sudan Republic and that the red locust swarms originated in Tanganyika and Northern Rhodesia.

This methodical spadework in London led to the establishment of the International African Migratory Locust Organization and the International Red Locust Control Service which concentrate on preventing locusts from swarming in these regions. The result is that Africa has been free of red and migratory locust plagues for the past fifteen years, though Dr. Uvarov refuses to claim at present that this is definitive.

The desert locust is a much harder nut to crack. It is a nomad, like all the other creatures adapted to survival in the desert, and it travels in giant leaps. Breeding places of successive generations may be as much as 1,000 miles apart.

CONTINUED ON NEXT PAGE

A DESERT IN THE HEART OF LONDON

(Continued)

An ecological survey of its breeding places is now being conducted by two scientists, George Popov of England and Charles Rossetti of Switzerland, financed jointly by FAO and UNESCO (UNESCO's contribution is part of its major project on scientific research to aid arid lands).

The job is an enormous one: last year, the two men visited Sudan, Chad and Ethiopia and this year are working in Mauritania, the Sudan Republic (formerly French Sudan) and Niger. This is a long-term study of the conditions under which desert locusts breed.

In London, one huge room of the centre is devoted mainly to keeping track of the desert locust's movements. In this geographical service as well as in every other section of the centre, basic and applied research are happily married.

Each year the centre's geographers receive thousands of reports of locust movements which are invaluable to the basic research task of trying to pin down the insect's principal breeding areas. At the same time, these reports form the raw material which goes into the monthly bulletins of the International Desert Locust Information Service operated by the centre and sponsored by FAO.

For example, one morning, a short while ago, a sheaf of cables and letters was awaiting Miss Zean Waloff, who is in charge of this service :

"About half dozen swarms entering Pakistan from west. Locuswar."

"Eritrea no swarms reported hopper infestation Arkiko Wangabo now controlled. Locust Asmara."

Miss Waloff turned to a huge map covering one end of the room, but still not large enough to chart all the wanderings of the desert locust which has even been seen 1,200 miles out in the Atlantic Ocean.

"The situation is serious this year, she explained, there has been spring breeding in northern and northwest Africa from Morocco to Libya. We knew about heavy swarms in Arabia and the Middle East and now some are reported in Pakistan."

'Your country is being invaded'

On the basis of this information, the anti-locust centre publishes forecasts in its monthly bulletin. If the situation is dangerous, special warnings are issued. The last one, in October 1958, reported heavy breeding in the Sudan, northern Ethiopia, Niger and Mauritania and predicted serious breeding early this year.

In emergencies, the centre uses "signals" by cable or even telephone. One such "signal" involved ringing up an ambassador in London to inform him that locusts were headed for his country from across the border of another country with which his capital had no diplomatic relations.

Locusts pay no attention to politics.

The Anti-Locust Research Centre in London is now directed by Dr. T.H.C. Taylor with Dr. Uvarov, his predecessor, in retirement, as a highly active consultant. A few doors away from Dr. Uvarov's office is a locust-breeding laboratory known to experts the world over. The locusts are either used for experimental purposes on the spot or are shipped out to universities and research institutes.

This is another case of basic and applied research going hand-in-hand. Locust-raising here is mass production at the rate of a million eggs and 50,000 adult locusts a year. In England alone, locusts are shipped (by ordinary post) to seventy scientists conducting research and they go to five universities in continental Europe as well.

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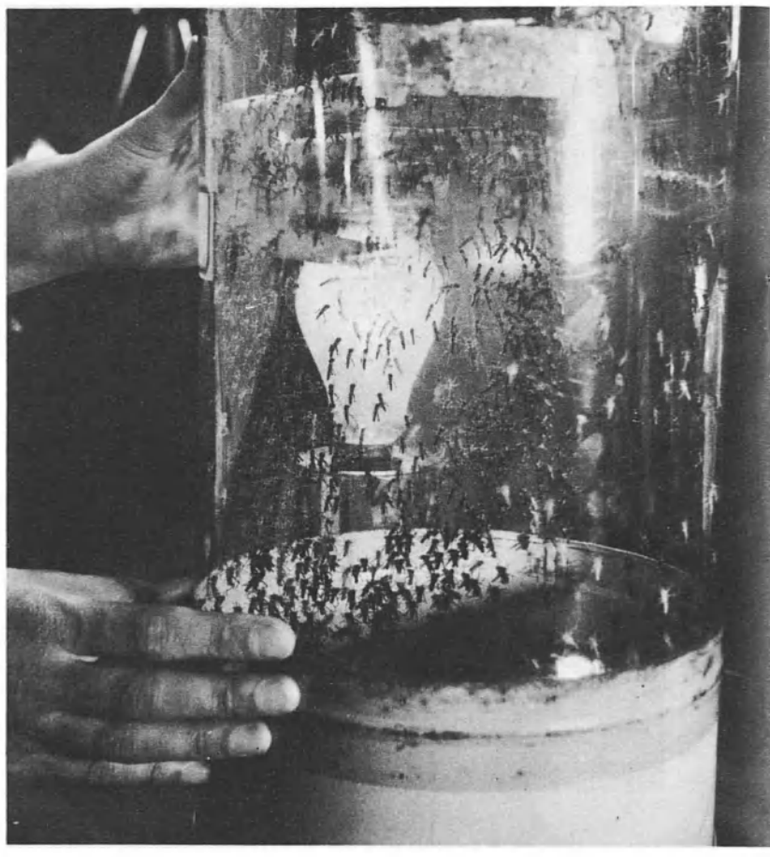
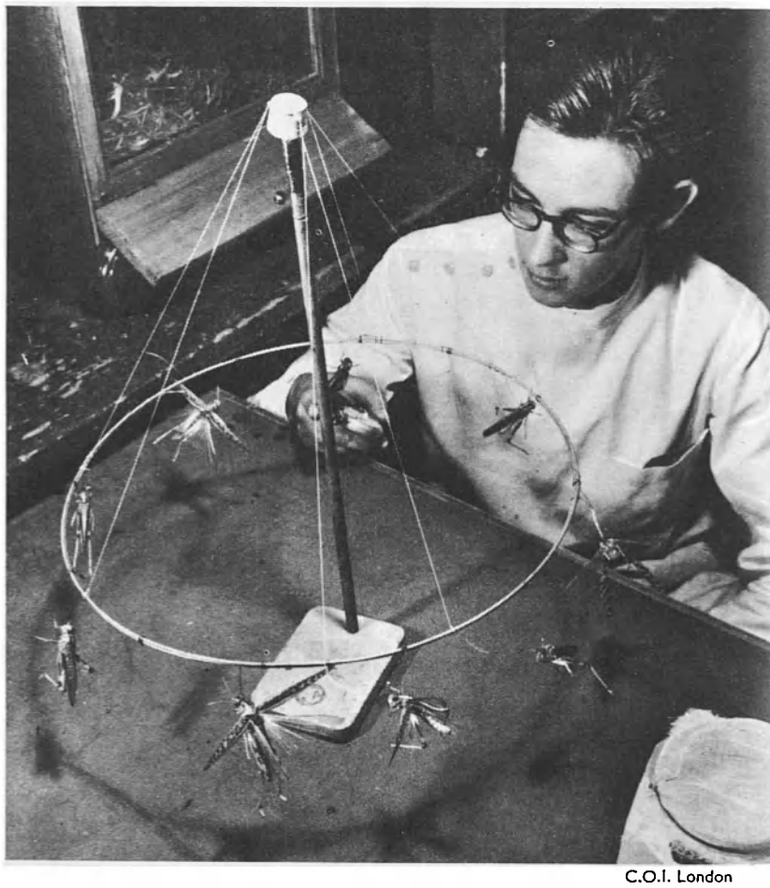
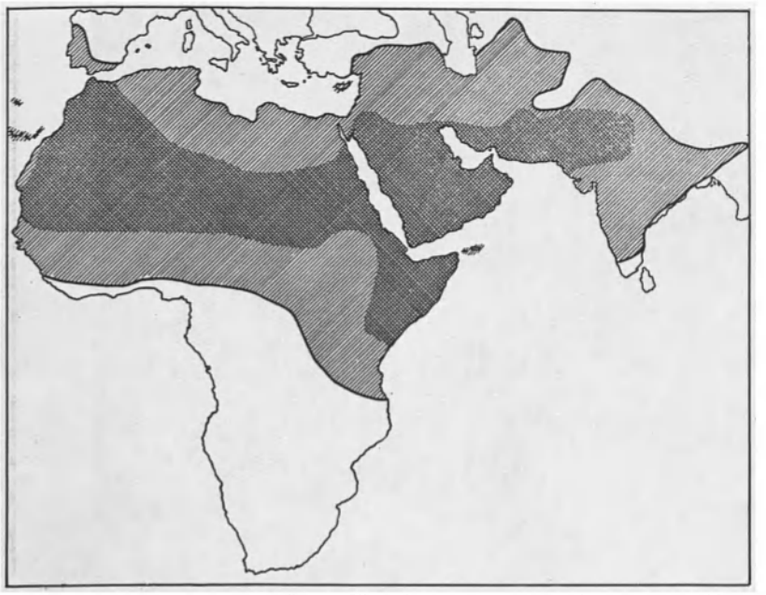


BABIES BY THE THOUSAND are produced daily in the Anti-Locust Research Centre and raised to adulthood. Fully-grown insects are then shipped to scientists in England and to universities in continental Europe. Even laboratories in Africa order supplies when locusts are "out of season" there.



C.O.I. London

'MERRY-GO-ROUND' for locusts used at London Research Centre. When the insects find themselves suspended in air, they begin to fly and turn the wire frame "roundabout". In this way, some estimate of the speed and duration of the flight of which they are capable can be made.



From "Climatology and Microclimatology", Unesco, 1958

INVASION ZONE of desert locust, divided into two parts covering 11 million square miles of Africa and Asia, shows size of the problem. Light shaded area shows total invasion area; central dark zone covers region where breeding or swarms occur at least one year in two.

★

HOPPERS ON THE MARCH

Life cycle of the locust consists of three stages: egg, hopper and adult. Locusts breed in the desert, yet lay their eggs only after rain. To develop, the eggs must absorb more than their weight in water. If not in contact with water during the incubation period (two weeks) the eggs die. During the hopper stage, lasting 5 to 6 weeks, the young locusts are unable to fly. They come together in bands of thousands, millions or even hundreds of millions and begin to march in search of green food, again only to be found in desert areas after rain. Excessive heat or dryness may kill the hoppers. For a few days after becoming adults the locust swarms take short daily flights to test their wings, prolonging these flights until a true migration starts. The hopper stage is the most vulnerable to attack by ground bait and aircraft spraying. Photo shows part of a vast army of hoppers on the march in a wheat field near Baghdad, stopped by an irrigation ditch too broad for them to cross.

FAO-Peter Collins

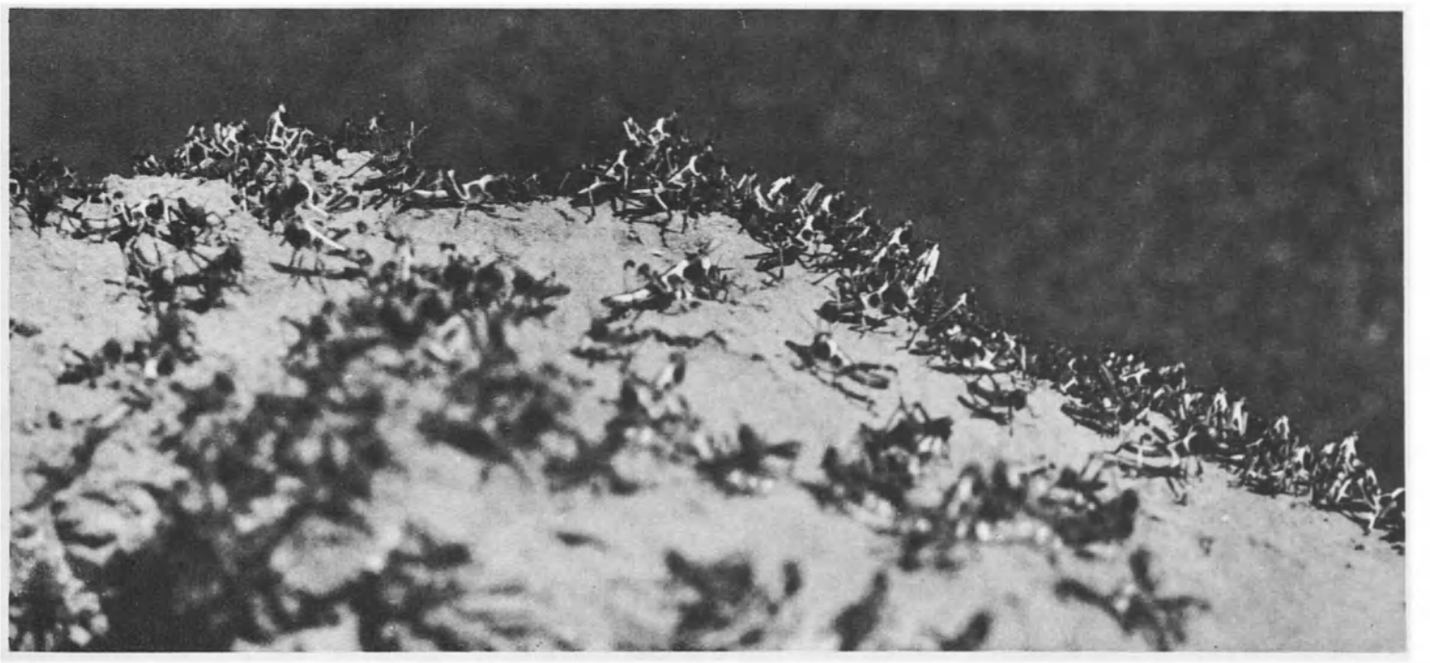
INT'L AIR SQUADRON IN ANTI-LOCUST WAR

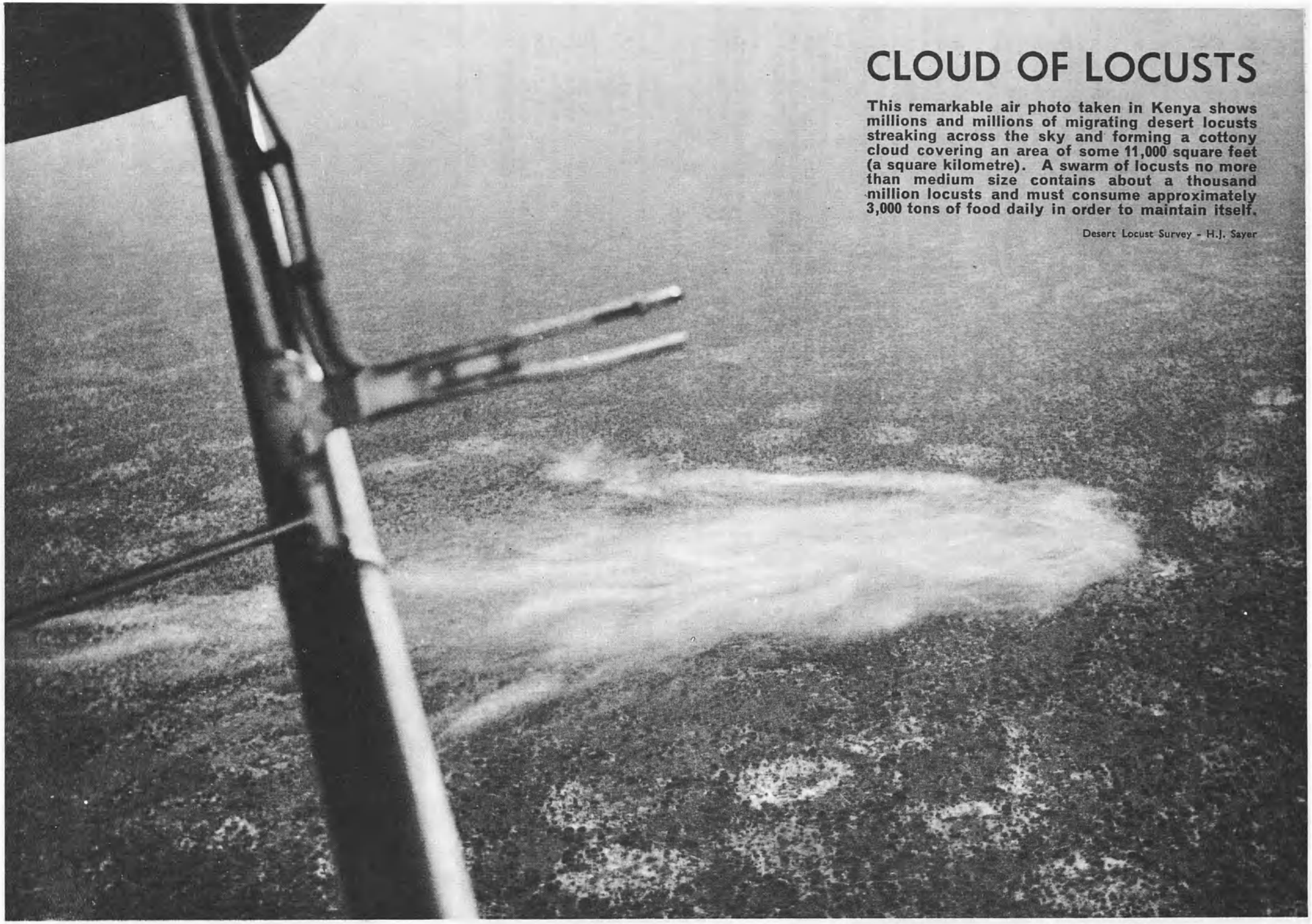
An international anti-locust aircraft squadron may soon join scientists on the ground in a stepped-up attack on desert locust invasions. The creation of the aircraft unit has been proposed by the Food and Agriculture Organization of the U.N. following impressive results achieved by aircraft in the past few years. In 1957, for example, 171 aeroplanes and helicopters were used in operations against the desert locust in 23 countries, and proved both far more economical and more effective than ground techniques.

FAO reports that aircraft spraying of only 60 gallons of the pesticide diazinon killed an estimated 180 million adult locusts during one invasion. Air operations in Morocco this year successfully sprayed swarms of locusts at about half the price of traditional ground methods using bran as poisoned bait. Similar results have been achieved in Pakistan and Iran. Aircraft have been found to be the only way to determine the number and size of swarms during invasions. Aircraft have regularly sighted swarms at distances of up to 100 kilometres, and have been effective in searching areas 9,000 square kilometres in size.

The international anti-locust aircraft squadron would be made up of specially equipped planes belonging to individual nations. When an invasion alert sounded the squadron would be united in a concentrated attack on the threatened or infested area.

One of the latest battles in the war against the desert locusts is now taking place in Jordan. The locust invasion has built up over the past few weeks and has now reached serious proportions. The swarms have laid eggs across 50,000 hectares of cultivated land and the breeding area is still increasing. A shortage of poisoned bran has heightened the crisis. Turkey, Lebanon and the Syrian Region of the United Arab Republic have responded to an FAO appeal and are coming to Jordan's aid.





CLOUD OF LOCUSTS

This remarkable air photo taken in Kenya shows millions and millions of migrating desert locusts streaking across the sky and forming a cottony cloud covering an area of some 11,000 square feet (a square kilometre). A swarm of locusts no more than medium size contains about a thousand million locusts and must consume approximately 3,000 tons of food daily in order to maintain itself.

Desert Locust Survey - H.J. Sayer

They came They saw They conquered

Photos Anti-Locust Research Centre, London

Devastation caused by the desert locust is vividly illustrated in these three photographs. Top, healthy orange grove in the Souss Valley (Morocco) before a locust swarm spotted it. Centre, locusts form vast cloud blotting out trees and landscape as they swoop down on target. Bottom, orange grove stripped clean and soil nibbled bare after passage of marauders. A single swarm may range 3,000 miles and may number as many as 1,000 million locusts. In 1954 remnants of a desert locust swarm from Africa reached the British Isles after a flight of more than 1,500 miles over the open seas. A single locust weighs only a tenth of an ounce but a swarm can weigh 20,000 tons and must eat its weight in green food daily. Locust clouds leave not only ruin and despair in their trail but further potential scourges, for if the locust meets favourable weather conditions it breeds and lays eggs as it moves along—and another swarm is born.

Photo André Lestage

IS THE OCEAN IN DANGER ?

by Nicolas Gorsky

Member of the U.S.S.R, Geographical Society

The amount of radio-active substances dissolved in the waters of the oceans and seas is infinitesimal. The rocks forming the Earth's crust contain a hundred times as much radio-active potassium as sea water and thousands of times more uranium. The radio-activity of the sediment at the bottom of the ocean is somewhat higher than that of the water above it. The concentration of radium in the iron-manganese concretions that form at the bottom of oceans and seas is relatively high, even higher than in the underlying sediment, but the mysterious source from which they derive radium has not been definitely established.

Manganese and radium are to a certain degree related and manganese apparently has the ability to extract radium from the sediment; it is a fact that there is always more radium on the bottom side of the concretion. Radio-active substances in the sediment are probably fission products of uranium, washed into the sea in solution by the rivers.

What must be borne in mind is that the highly diversified plant and animal life of the seas and oceans is accustomed to a very low concentration of radio-active substances. It is precisely from this quarter that a grave danger has arisen.

It has not yet been established what doses of radio-activity are innocuous for marine plants and animals. It is only known that fishes concentrate phosphorus and zinc in their bodies, while molluscs and crustaceans concentrate calcium, strontium and a number of other elements included in radio-active fission products.

Two days after atomic bomb tests at Bikini atoll, the radio-activity of the upper layer of water increased a million times over the normal. Four months later the radio-activity of the water 1,500 miles away was three times greater than the normal. In thirteen months the contaminated water had spread over an area of over one million square miles. The artificially caused radio-activity had decreased by this time until it was only one-fifth higher than the normal but it could easily be detected 2,500 miles away from the source.

How old are the deepest waters?

It is interesting to note the manner in which this radio-activity was dispersed through the ocean. Three long strips of high radio-activity were discovered: one stretched westward from the site of the explosion along the North Equatorial current, a second dipped away from the first to the southwest, while a third extended eastward in a direction opposite to that of the Equatorial current.

In the first and second strips, equal radio-activity was found at a distance of 2,000 and 1,000 miles from the atoll; in the third, the radio-activity at a distance of 750 miles was three times higher. In the case of the first strip the ocean current played the major role; the second and third strips are assumed to have been formed by radio-active dust borne by air-currents. According to Japanese scientists, the concentration of radio-active elements in the water after the explosion was considerably higher than the safety limit.

The immediate and urgent task confronting science is to study the dispersion of radio-active fission products, and their effect on marine life, both plant and animal.

Due to the rapid development of the atomic industry the problem of safely disposing of radio-active waste-products has become urgent. In Britain, radio-active wastes are in some places drained by pipes into the Irish Sea, while at Oak Ridge in the United States they are drained into the Tennessee River system. Some wastes in the United States are buried in the ground or sunk in the deep sea in special containers.

The sea water, however, will very quickly eat through the walls of these containers and dissolve their dangerous contents. Then, too, if scores, or it may be hundreds, of containers with their sinister contents are being thrown into the sea today, the number will rise to tens or even hundreds of thousands in the near future.

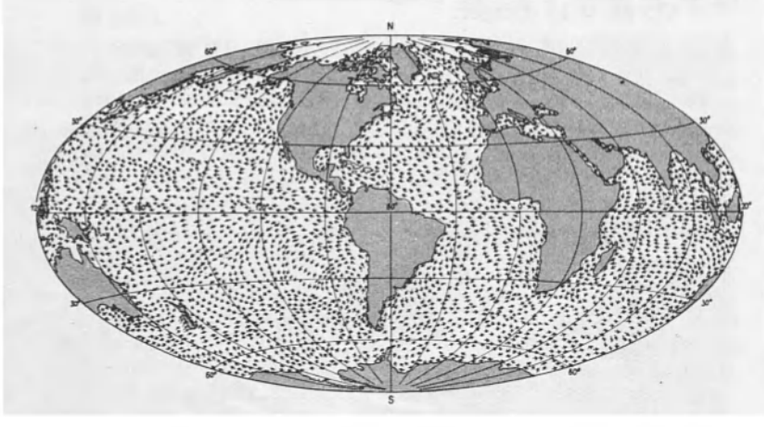
There are deep places or trenches in the oceans, particularly the Pacific. The average depth of the ocean is about two and a half miles, but in these depressions it reaches between four and five miles and in places up to seven miles. Proposals are being made to use these depressions as dumping-grounds for radio-active wastes.

This confronts oceanographers with the problem of determining the age of the waters in the ocean depths. Once purely theoretical, the question has now come to have great practical significance. How long will it take radio-active substances dissolved by the water at the ocean bottom to rise to the surface? Will the process of radio-active decay which is always at work render them innocuous before they reach the surface, or will they still be sufficiently radio-active to poison the upper, productive layers? It should be noted that the annual production of the sea-fisheries (fish, crustaceans and molluscs) comes to some twenty million tons, and that over half a million boats are engaged in the industry.

There is not a gulf or sea that is not connected with the oceans in a general system of water circulation. It is impossible to localize or isolate the poisoning of sea water. The map of the ocean currents on this page graphically illustrates this unity.

Scientists hold widely differing views as to the time required for the water at the ocean bottom to be renewed. Wüst (Germany) has calculated that the cold, heavy Antarctic waters, after descending to the depths of the Weddell Sea, reach the equator in five years four months, while Deacon (Britain) puts the figure at eighteen years. At the same time Worthington (United States) holds that the waters at the bottom of the Atlantic date back to 1810 when the climate became much colder, and have not been renewed in the century and a half that has elapsed since then.

The New Zealand oceanographers, Brodie and Burling, have put the age of the Antarctic waters 150 miles to the north of Scott Island at a depth of 8,500 feet at 2,500 years, and of the waters near Campbell Island at a depth of 2,624 feet at 1,900 years. The New Zealanders used the Carbon 14 method to determine the age of the water, but others hold that there are a number of factors besides time affecting Carbon 14, and accordingly that these conclusions must be accepted with caution.



THE OCEAN: AN INDIVISIBLE WHOLE. There is not a gulf or sea that is not connected with the oceans in a general system of water circulation (as map above shows). In other words, the oceans and seas are joined to form an indivisible whole—the World Ocean. It is impossible to isolate or localize the poisoning of sea water. When radio-active substances are introduced into the ocean at any spot they are dispersed for thousands of miles to contaminate an enormous area.

Oxygen miles down in the Pacific

The Danish expedition on the Galatea and Soviet expeditions on the Vityaz found dissolved oxygen in water from the very deepest Pacific trenches. It can be confidently stated that water buried at the bottom of the ocean for hundreds of years, let alone thousands, could contain no oxygen. It would be consumed in a much shorter time in various processes, both physico-chemical (the oxidation of mineral substances) and biochemical (the respiration of living organisms and the putrefaction of dead ones)—processes that are constantly at work at the bottom of the ocean and in the water above.

The Danish and Soviet expeditions discovered various forms of animal life at the bottom of the ocean trenches, which had till then been thought to be void of life. These animals included among others coelenterates, echiurides, goloturians and bivalve molluscs. All these animals consume oxygen continually and they would long since have exhausted the supply in the water round them if there were no currents.

What, then is the source of the oxygen at depths of up to seven miles? Up to now scientists have explained the aeration of the bottom layers of the ocean as being a consequence of the general circulation of the ocean

CONT'D ON NEXT PAGE

IS THE OCEAN IN DANGER? *(Continued)*

water. In the Polar regions the cold, heavy water submerges into the depths and slowly moves toward the equator, bearing with it the oxygen dissolved at the surface. But it takes scores of years for it to reach the equator. The dissolved oxygen could hardly be preserved for such a lengthy period—that is the weak place in the hypothesis.

Some oceanographers consider that oxygen is carried to the bottom of ocean trenches by turbidity currents. This is the term applied to the avalanches and landslides on the slopes surrounding the depressions. These are due to earthquakes or other causes, and as they plunge to the bottom of the depressions they carry along with them large volumes of water saturated with oxygen. But turbidity currents are only chance occurrences. In the intervals between them life at the bottom of the depressions should be extinguished for want of oxygen. This, however, has not happened during the millions of years that the ocean and its trenches have been in existence. Evidently the oxygen must penetrate to the depths of the ocean in some other way.

Professor N.N. Zubov, the Soviet oceanographer, recently suggested a new and more plausible hypothesis.

It seems that when volumes of sea water of different temperature are mixed, the density of the mixture is greater than either of the components. Being heavier than the surrounding water, it descends to the lower layers of the ocean carrying dissolved oxygen with it.

Perpetual motion in deep places

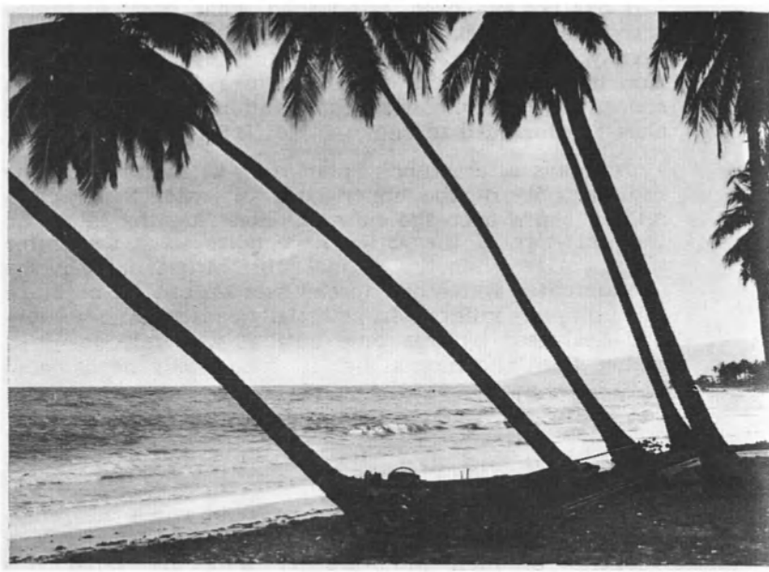
THE water in the ocean is not homogeneous; its temperature varies both vertically and horizontally. What is more, the water in the ocean is continually in motion, neighbouring layers often moving in different directions. In this way water of different temperatures is being constantly mixed and is sinking as it becomes heavier. An equivalent volume of lighter water is displaced and rises to the surface. This eternal process extends to all the depth of the ocean, apparently penetrating to the bottom of the trenches.

We do not know as yet how long it takes surface water to descend to the ocean bottom, but evidently its movement is relatively rapid since it retains dissolved oxygen. Among the many depressions studied by this year's Soviet expedition on the Vityaz was the Tonga trench, investigated six years ago by the Danish expedition on the Galatea. Measurements made this year gave a difference of 0.2° in the temperature of the water.

When one takes into consideration the great accuracy of the deep-water thermometers used by oceanographers, one realises that this is a significant deviation indicating the existence of what is probably a very slow but continuous exchange of water between the bottom, intermediate, and surface layers of the ocean, even in the regions of the deepest depressions.

The vertical circulation which is a consequence of the mixing of the sea water and its increase in density, as described by Professor Zubov, ventilates the deep layers of the ocean and also raises to the surface a layer rich in nutrient phosphates and nitrates, forming a basis for abundant life. But this process will bring death if pernicious radio-active solutions from the waste-products of the atomic industry accumulate in the ocean depths.

In this connexion another phenomenon occurring in the oceans and seas should be mentioned—what is known as upwelling. Due to winds, currents or the relief of the ocean bed, deep, cold layers of water, rich in nutrient salts,



Photos André Lestage

rise to the surface in some regions along the continental slope or along submerged banks. This phenomenon is well known along the Atlantic coast of North America, the California coast and the Western coast of South America and Africa. The regions where upwelling occurs are exceptionally rich in plant and animal life, including fish. If the water rising to the surface should be contaminated with substances dissolved out of radio-active wastes it will mean the end of the highly productive fisheries in these regions.

The oceans and seas are joined to form an indivisible whole—the World Ocean. No open part can be considered isolated and cannot belong to any one country. Radio-active substances introduced into the ocean at any spot will be dispersed for thousands of miles and will contaminate an area of millions of square miles. For that reason, all questions concerning the contamination of the ocean by radio-active substances, irrespective of their origin or purpose, just as investigations into the effect of radio-active substances on marine life, acquire international significance and should be solved through friendly, concerted international scientific co-operation.

The rate at which the atomic industry is developing shows that it is necessary to set about the study of this problem immediately. Uncontrolled contamination of the oceans and seas can lead to irreparable catastrophe within ten to twenty years. The Ocean, that great and inexhaustible source of food for man must be protected. The Ocean is in danger.

A DESERT IN THE HEART OF LONDON
(Continued from page 24)

THE GRASSHOPPER & THE LOCUST: DR. JEKYLL & MR. HYDE OF INSECTS

"We have a budget of only £70,000 a year," Dr. Uvarov pointed out. "If we tried to do everything ourselves we would get nothing done. So we encourage others to help us by supplying them with research grants and raw material—that is, locusts."

With a twinkle in his eye, he added: "Why we even send locusts to laboratories in Rhodesia and Ghana—it's more practical to write to us than to try to catch them out-of-season.

In the laboratory, under the direction of Mr. Philip Hunter-Jones, desert locusts are raised under conditions as close to normal environment as possible. They are bred in constant-temperature rooms where the thermometer always stands at 29 degrees C., laying their eggs in small tubes of moist sand. They are fed on succulent grass—which often raises a food supply problem in the middle of an English winter.

The desert locust needs moist sand to lay its eggs and this characteristic is worrying scientists as they watch the spread of irrigation in semi-arid lands. In certain cases, and at great expense, man seems to be unwittingly creating new locust breeding grounds.

Locusts' 'rain-sense' myth exploded

With the help of its laboratory and the world's biggest library on locusts, the centre has been able to explode a number of myths concerning the desert locust and is now exploring certain characteristics of this insect which may hold the key to its ultimate control.

Dr. R.C. Rainey, a "biometeorologist" (that is, a biologist and meteorologist) is one of the men responsible for shattering some of the myths. His studies both in East Africa and at the centre have explained much of what used to be called "the psychology of the locust."

Popular belief once held (and often still does) that desert locusts move with unvarying intent and purpose, and that they are even capable of sensing rain from a distance in the desert, swarming down at the right moment to eat the plants it produces.

But studies of swarms both from the air and with cameras on the ground show that locusts consistently move downwind at a speed equal to or less than the speed of the wind (their own flying speed is from 10 to 12 m.p.h.).

Actually, Dr. Rainey stated, the individual locusts fly in all directions, making it impossible for a man on the ground to tell in which way the swarm as a whole is moving. The swarm's course is exactly like that of an aeroplane pilot who is lost: he flies around in circles but his position changes because he is drifting with the wind.

This downwind movement often takes the locusts into what meteorologists call "areas of convergent wind flow" which can produce rain in arid regions. That, in Dr. Rainey's opinion, is how desert locusts "find" rain.

According to another old belief, locust swarms fly when the barometer drops, but the centre's research has shown that atmospheric pressure has nothing to do with flight. "The locust can only take off when its muscles are warm," Dr. Rainey explained. "At a temperature of about 25 degrees C. (77 degrees F.), its 'engine' is warmed up for flight. The atmospheric pressure often drops in arid regions when temperature rises and that is why people once thought the barometer had something to do with the flying of swarms."

Meteorology has also provided the answer to the astonishing heights reached by desert locusts. Aircraft have sighted them flying at 10,000 feet and some have been seen on mountain passes 20,000 feet above sea level. In this case it is the powerful convection currents from the desert which send them spiralling upward.

As for the biological side of biometeorology, Dr. Rainey is studying the insecticides used against the desert locust. These insecticides must be powerful enough to kill tons and tons of locusts and yet at the same time do no harm to plant and other animal life.

Insecticides involve the study of the physiology of the locust—one of the most fascinating aspects of the London centre. It is carried out under Dr. Peter T. Haskell, a young scientist who works in a room filled with electronic apparatus capable of measuring such things as the smell, eyesight and hearing of a locust. There is even a "wind tunnel" for flight-testing.

Dr. Haskell and Mr. Hunter-Jones are attacking different aspects of the problem of why desert locusts swarm. This is one of the most puzzling metamorphoses of nature. If left alone, the species is an ordinary green grasshopper. But, in a crowd the relatively inoffensive grasshopper becomes the gregarious, predatory desert locust. Its colour turns to yellow and black, its wings lengthen and its head thickens.

No differences explaining this Jekyll-and-Hyde conduct can be detected when a locust and a grasshopper are dissected and examined under a microscope. Dr. Haskell suspects that there must be some aspects of the desert locust's central nervous system which causes it to seek the company of other locusts and to form a havoc-making swarm.

In his research, he uses some rather amazing devices. One, for example, which could be called a locust-tickler, was developed by Dr. Peggy E. Ellis, a member of the centre working at Oxford. It consists of a jam-jar with an electrically driven wheel bearing rope fibres turning inside it. The fibres stimulate the tactile organs of a young locust in the hopper stage and, so far, the experiments show that exciting its sense of touch seems to make it more willing to seek the company of other locusts.

Infra-red lamps warm the desert

Dr. Haskell also rules the only artificial desert in London. It is a flat wooden tray about ten feet square with a sand floor an inch thick. Two infra-red lamps beat down through its glass roof while wind is created by an electric fan. This artificial desert has already demonstrated that young hoppers are quite capable of finding grass by their sense of smell. It also shows that they congregate in still air and disperse in a wind.

With all these weapons, the centre has hopes of solving the desert locust problem—but not overnight. Basic research must first give science the explanation of the dreaded insect's life before control measures can be taken.

Dr. Uvarov is cheered by a precedent. A team from the Anti-Locust Centre spent five years in Cyprus studying the so-called Moroccan locust. They learned that the insect flourished on overgrazed patchy terrain because it needs bare soil to lay its eggs and grass for food and shelter. On this basis, the centre was able to recommend a moderate control of grazing to eliminate the locust's grassless breeding grounds.

"The locust will be there but it will not swarm," said Dr. Uvarov. "And that is what we are trying to do with the desert locust as well. We will succeed if we have the time. Even if we had unlimited money and equipment at our disposal, we would still need time. There are no shortcuts in science."

Letters to the Editor

NEGRO DANCES & CUSTOMS

Sir,

I want to make a humble protest against so much lauding of the Negro races. They have great values, and must be treated with equal opportunities and I know we must do them justice in every way. But to pretend to see spiritual values in all their dances and in some of their revolting habits and customs is going too far.

E. Picton-Tubervill
Cheltenham, England

BREAKING LANGUAGE BARRIERS

Sir,

...Language still continues to be the chief barrier standing in the way of the peoples of the world coming together. May I, therefore, suggest that THE UNESCO COURIER give greater attention to the major languages of the world? Articles to stimulate interest in the study of languages should be published in every issue of this magazine. Linguistic habits and customs, parallels and peculiarities, famous books from different languages and similar subjects would go a long way in bringing closer the nations of the world.

D. Viswanadha Babu
Vizianagram, Andhra, India

THE RIGHT APPROACH

Sir,

I am a student, and although I only recently made my first acquaintance with THE UNESCO COURIER it has already added to my understanding of many things. I was especially pleased with the issues devoted to the International Geophysical Year and to the Brussels World Fair. I also enjoyed those telling about the drawings of famous writers, the archaeological findings in Mexico, and the ancient art of Ceylon.

Your publication offers much to those interested in art and ethnology. I disagree with those readers who have asked you to publish more "specialized" and "scholarly" articles. I believe the purpose of the magazine is best served by the type of article it now prints. I find the illustrations excellent and should like more of them—they liven up the text.

S.V. Lashin
Krasnodar, U.S.S.R.

INTEREST REVIVED

Sir,

May I congratulate you on the December 1958 issue of THE UNESCO COURIER. I must say that my interest in the magazine had waned because for a few months, it was rather boring to read save for an odd article. Anyway the December 1958 issue has ended with a more appetizing flavour... Special mention must be made of articles re "The Orient Today and Yesterday," "All Men are Brothers" and "The World is Sick of Hatred." I certainly enjoyed reading them.

Olga M. Stephens
London, England

SCIENCE HAS A PURPOSE

Sir,

I was very much interested in the speech made by Bertrand Russell on receiving the Kalinga Prize for 1957 (February 1958 issue), but I beg to differ with Russell when he says that "At present, scientific technique advances like an army of tanks that have lost their drivers, blindly, ruthlessly, without goal or purpose." That is not so. There is both a goal and a definite plan for achieving it. It seems to me that if nature, "working" without a plan and in a laboratory as imperfect as our planet, has been able through countless numbers of experiments (as Darwin has pointed out) to produce as complicated a mechanism as the human brain, human beings armed with plans and the latest achievements of science will be able to produce a life of plenty for all peoples on the earth.

A. Khizh
Moscow, U.S.S.R.

EACH ONE REACH MANY

Sir,

I read with interest your appeal for new readers in the June issue of THE UNESCO COURIER. Please find enclosed a cheque for £4.0.0 together with the names of eight new subscribers. I find great satisfaction in doing this, knowing that perhaps I am contributing to foster understanding among people and I would like to continue to increase the number of readers.

A. Martinez
Chelmsford, England

ART & ABNORMALITY

Sir,

The May number of THE UNESCO COURIER is extremely interesting. The care and cure of mental patients is an urgent need, and the progress made is impressive.

However, one sometimes wonders if the psychiatrists are not creating their own patients. We have learnt to accept maladjustment as the new explanation for bad behaviour, and we struggle to comprehend the jargon of psychiatry. But the explanation given of the child's drawing on the back cover is straining credulity too far. The turnip-headed little creature on a tight-rope could surely have been drawn by any normal child? One wonders what this psychiatrist would have said of the child who made a drawing of a policeman, with blue helmet and tunic, and bright yellow buttons, but no feet. Obviously a subconcious fear of the law as symbolized by those slow, sinister, tramping feet. The child's explanation was much simpler. He had no black chalk!

Elinor D. Rhodes
Faversham, England

BRICKBATS & BACK PATS

Sir,

... I am afraid I expected something definitely more educational than I found in the issues received by me for last year. It seems a pity that with the wonderful opportunities UNESCO has that they have not produced a magazine of greater value.

M. J. Clarke
Port Elizabeth, South Africa

Sir,

Congratulations on the high standard of quality of the articles you publish and also on the fine photographs which illustrate them.

Jeanne Bouet
Paris, France

Sir,

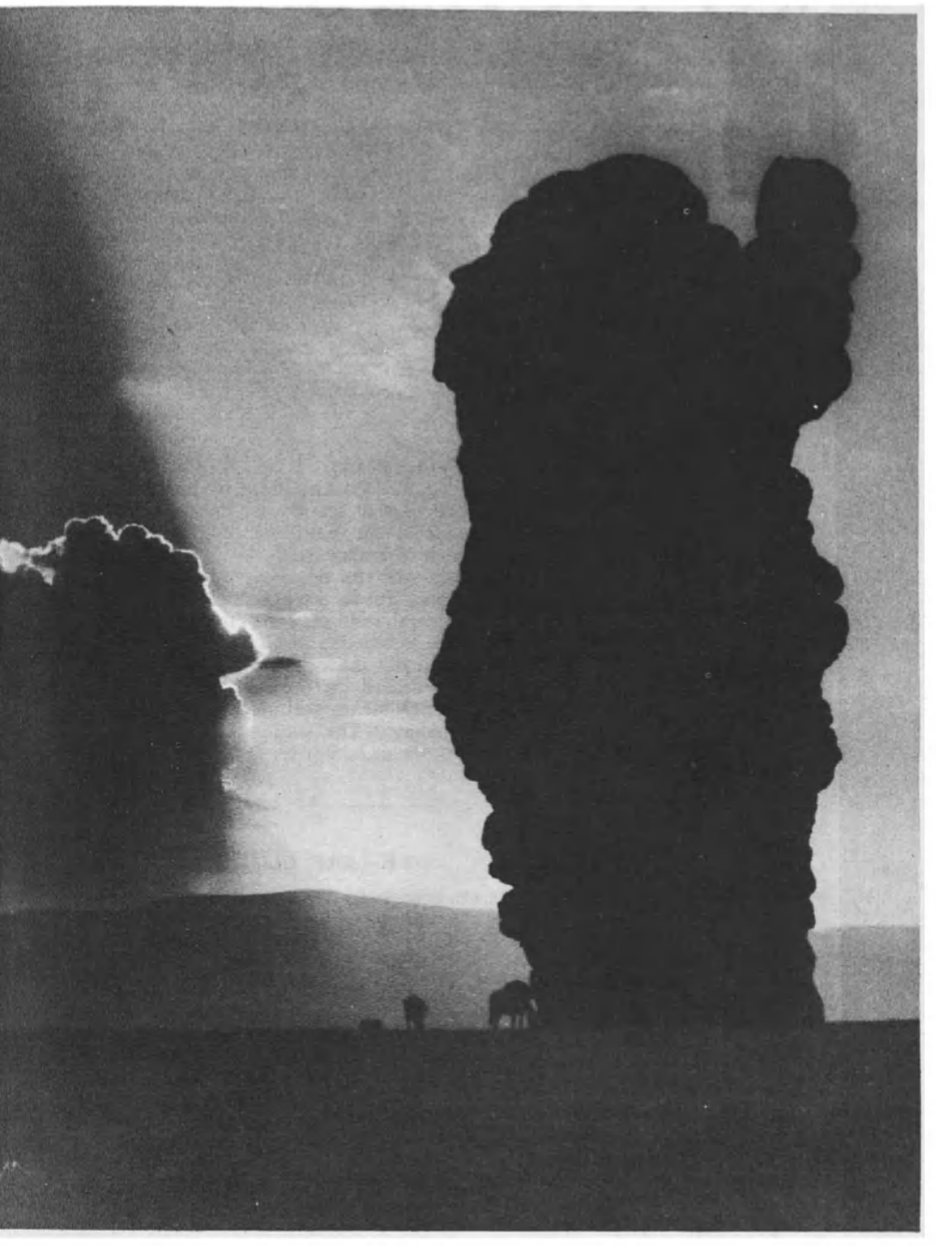
I have the feeling that your magazine is less interesting than it used to be when I first became a subscriber. I would like to find in it fewer scientific articles and more reports about everyday life in all countries written in a simple style, thus making the reading of it a pleasure and not a chore.

E. Boudot
Nantes, France

Sir,

I get the greatest satisfaction from reading your magazine each month. One recent article, in which deserved tribute is paid to Mahatma Gandhi, is a case in point, for in our epoch of upheavals, starved of moral awareness, constantly threatened with a shattering of the peace which *he* so ardently desired, you show us a most extraordinary personality, one most worthy to be known by the whole of humanity.

Gladys Viola
Rosario, Argentina



NATURE'S INVENTIVE GENIUS IN STONE

Sir,

In the summer of 1957 I set out to make a film on the subject of erosion. In the Crimea, the Caucasus and the Urals, particularly on the banks of rivers like the Petchora and the Tchussovaya, I came across the most extraordinary stone statues with forms as striking as they were varied. But it was not the hand of a sculptor which had shaped these bizarre monuments; it was Nature herself—water, variations in temperature, the wind, the erosive action of glaciers—which over millions of years had gradually produced them.

The most remarkable of these stone forms are found in the northern Urals, on the mountain where the Petchora River has its source. They have strikingly different shapes, which are completely transformed according to the angle from which they are seen.

I was particularly struck by a group of seven great stones, for all the world like petrified giants. Close by, another rock rose up in the form of a lion's head complete with mane and not far off was a great mass of rock looming up like a medieval fortress, its summit, viewed from another angle, recalling the shape of a crouching camel.

Nature has embodied much that is artistic in these age-old works. But this is not the only reason why I believe these natural monuments should be preserved and protected from the elements—and from man's negligence. These "stone mysteries" have a great scientific importance for they will aid future generations of geologists to understand and write the history of the earth, deepen our knowledge of the process of erosion and also help the discovery of veins of useful or valuable materials such as marble, iron, coal, gold, platinum to name but a few.

It is not only possible, but also very vital to preserve these natural monuments which are certainly to be found in great numbers around the world, and an active campaign aimed at this work of protection should be launched.

M. Zaplatine.
Moscow U.S.S.R.

From the Unesco Newsroom...

ANNIVERSARIES OF GREAT MEN: This year, UNESCO will give its patronage to celebrations marking Chekov's centenary and to cultural events in Poland commemorating the 150th anniversary of the birth of Chopin. It will also help to organize a symposium on the work of Darwin to mark the 100th anniversary of the publication of "The Origin of Species". UNESCO will also invite its 81 Member States to associate themselves with the celebration of other anniversaries that fall in 1959-1960 —those of Shalom Aleichem, Henri Bergson, Pierre Janet, Franz Josef Haydn, Alexander von Humboldt and Friedrich von Schiller and will itself publish and distribute articles and prepare sound recordings, radio scripts and filmstrips devoted to these anniversaries.

■ **U.S. AND U.S.S.R. ARRANGE YOUTH EXCHANGE:** *Seventy-two American and 24 Soviet young people are due to participate this year in the second exchange of youth groups between the U.S.A. and the U.S.S.R. under an agreement between the Council on Student Travel, New York and the Soviet Committee of Youth Organizations. This provides for the Americans to spend 40 days in the U.S.S.R., including vacations in summer camps and visits to Moscow and Leningrad, meeting young people, interviewing youth leaders and sight-seeing. The Soviet group will arrive in the U.S.A. in October for 30 days of visits to colleges and American homes.*

ENERGY-HUNGRY WORLD: World consumption of commercial energy has about doubled in the past twenty years reports the International Labour Office. As the world's population has increased during the same period from an estimated 2,000 million to 2,740 million, per capita consumption has therefore risen by about 44 per cent. Other facts from the report: petroleum is now the principal competitor of coal, followed by natural gas, and hydro-electric power; nuclear power will play a significant role in the future, but so also will other sources—solar energy, wind and tides—at present only playing relatively minor roles.

■ **$10 MILLION AID FOR THE WORLD'S CHILDREN:** *Assistance for the world's children totalling over $10 million was approved recently by the Executive Board of the United Nations Children's Fund* (UNICEF). *This represents about half the total* UNICEF *aid planned for 1959. The rest will be allocated in the autumn. The money will be devoted mainly to general disease control (42%) nutrition (41%) and basic maternal and child welfare (17%) in programmes which will benefit fifty countries and territories.*

AUSTRALIA'S ASIA WEEK: The International Club of the University of Western Australia recently arranged an Asia Week in Perth and as a follow up sponsored a 1,350-mile tour of the State's country districts in which seven Asian and ten Australian students combined their efforts in a campaign to tell Australians about Asia. The Asian students—Colombo Plan scholars from Burma, Indonesia, Malaya, Singapore and Thailand—lectured at schools, talked to public organizations and made broadcasts over local radio stations.

■ **CUBA'S EMERGENCY CLASSROOMS:** *The Government of Cuba recently launched a campaign aimed at finding 5,000 temporary classrooms. Farmers have been asked to lend to local education committees, houses, barns and store-rooms where classes can be held until new schools are built. As soon as temporary accomodation becomes available, the Ministry of Education sends a teacher with the necessary equipment to turn it into a classroom.*

POLISH ART GOES HOME: Some of Poland's most historical art treasures which were taken from the country on the outbreak of war for safe keeping abroad have now returned to their original owners —the National Museum of Warsaw, the Polish National Library, the Gallery of Wawel Castle in Cracow and the library of Pelplin Seminary. Items from these collections include the coronation insignia of the kings of Poland—in particular the famous "Szczerbiec" (Jagged) Sword—historical manuscripts and early printed works including a Gutenberg Bible, works of medieval and Renaissance craftsmen as well as some of Chopin's manuscripts and letters.

■ **COLOMBIA FIGHTS TO WIPE OUT ILLITERACY:** *A ten-year campaign to wipe out illiteracy has been launched by Colombia. School teachers and all persons holding diplomas as well as priests in every parish of the country have been asked to help. The government plans to eliminate illiteracy by 1969. At present an estimated three million out of a total population of nearly 11,500,000 are illiterate in Colombia.*

GEOTHERMAL ENERGY FOR THE U.S.S.R.: Construction of the first geothermal power station in the U.S.S.R. has started in the Baudjedka Valley area of southern Kamchatka (Soviet Far East). The station will run on underground steam which is plentiful in areas of volcanic activity. Steam resources on the volcano-surrounded Baudjedka Valley are believed to be practically inexhaustible. Wells are now being drilled on the construction site through which steam will pass to reach the turbine blades. The station will take two or three years to complete.

FOUR-LEAF CLOVER

We apologize to readers for an error made by our printers in the last issue. A caption on page 9 was inadvertently repeated on page 8. The page 8 caption should have read "Four-leaf clover design solves road junction traffic problems on one of the motorways near New York. This is a classic formula used at a simple intersection of highways, allowing one stream of traffic to cross or change direction without having to cut through other traffic lanes."

Nations to help in preservation of monuments menaced by Aswan Dam

THE United Arab Republic has asked Unesco for international aid to help preserve historical treasures in Nubia which are destined to be swallowed up by the Aswan Dam on which work will begin at the end of this year. A few years from now a huge lake created by this dam will irrigate much of Upper Egypt, but when this happens monuments as irreplaceable as the temples of Ahu Simbel, Debod and Kalabchah will be inundated by a man-made flood.

Egyptian authorities have already made plans to conserve this artistic and cultural heritage. Since 1955, a Documentation and Study Centre for the Art and Civilization of Ancient Egypt, set up with Unesco's help, has been preserving, through photographs, drawings, copies of paintings and plaster casts, the sanctuaries of Rameses II.

A plan under which Unesco would prepare a detailed programme of operations to be carried out, if necessary with the help of a special fund supported by Member States, was presented recently to Unesco's Executive Board. It calls for preliminary studies to be completed by the autumn.

Unesco is now to call a meeting of experts to decide how the work should be done. A photogrammetric survey of the region will he made in August or September and the experts will then estimate the cost of the programme so as to set a figure of contributions by Member States. The plan as a whole was approved by Unesco's Executive Board which will discuss at its next session the experts' report and that of Unesco's Secretariat concerning the preliminary work to be carried out.

Imp. GEORGES LANG, PARIS. IMPRIMÉ EN FRANCE.

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WAR ON LOCUSTS

FAO

The world's desert locust zone is an area covering no less than 11 million square miles of territory, englobing 65 countries and territories on three continents. The battle against this age-old plague is now organized on an international scale, and a large share has fallen to the United Nations. As a last resort, when preventative measures have not been taken in time, swarms have to be attacked on the ground with poison bait. Above, poisoned bran being sown during an invasion in Morocco. Below, handful of dead locusts, picked up from the thousands littering the ground after the sowers have passed, shows effectiveness of such campaigns. (See page 22)

UNATIONS